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APPENDIX 14

EMITTER LIBRARY CLASSIFICATION

FINAL SOFTWARE REPORT

DATA ITEM NO. A005

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INTEGRATED ELECTRONIC WARFARE SYSTEM  
ADVANCED DEVELOPMENT MODEL (ADM)

7500987-15  
PREPARED FOR:

NAVAL AIR DEVELOPMENT CENTER  
WARMINSTER, PENNSYLVANIA

CONTRACT N62269-75-C-0070

RAYTHEON

ELECTROMAGNETIC  
SYSTEMS DIVISION

1 OCTOBER 1977

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APPENDIX 14

EMITTER LIBRARY GENERATION REQUIREMENT  
FINAL SOFTWARE REPORT  
DATA ITEM A005

INTEGRATED ELECTRONIC WARFARE SYSTEM (IEWS)  
ADVANCED DEVELOPMENT MODEL (ADM)

Contract No. N62269-75-C-0070

Prepared for:

Naval Air Development Center  
Warminster, Pennsylvania

Prepared by:

RAYTHEON COMPANY  
Electromagnetic Systems Division  
6380 Hollister Avenue  
Goleta, California 93017

1 OCTOBER 1977

## INITIAL DATA REQUIRED:

Entries in the library shall each have the following information:

1. Min. frequency, max. frequency
2. Min. PRI, max. PRI
3. Min. PW, max. PW
4. Scan Type
5. Min. scan period, max. scan period
6. ECM technique
7. Identification code or name

## TRUNKS:

The emitter entries shall be combined so that all entries with the same values of 1, 2, 3 above become a single trunk. Trunks are stored in emitter library 1 (EL1).

## GROUPS:

Emitter entries shall also be combined so that all entries with the same values of 4, 5, 6, 7 above become a single group. Groups are stored in emitter library 2 (EL2).

## TABLES:

The following tables shall be generated to form the emitter library for IEWS:

### A. EL1

1. ZLS.F
2. ODA.F
3. ODV.F
4. ZLS.PI
5. ODA.PI
6. ODV.PI
7. ZLS.PW
8. ODA.PW

```

.NKEL
.ENT    ZLS.F
.RDX    10
.RDXU   16

**      ?K = 1

**      .DU    3
**      TYPE    F

ZONE 0 0
ZEND 0

ZONE 1 2560
LIST 1 2 3 4 21 22 23 24 41 42 43 44 61 62 63 64
ZEND 1

ZONE 2 2816
ZEND 2

ZONE 3 3072
LIST 3 6 7 8 25 26 27 28
LIST 45 46 47 48 65 66 67 68
ZEND 3

ZONE 4 3328
DUPL 1
ZEND 4

ZONE 5 3584
ZEND 5

ZONE 6 3840
DUPL 3
ZEND 6

**      ?K = ?K+1
**      .ENDC

.END    ZLS.F

```

FIGURE 1. FILE QTEST.SR

B. EL2 Data

C. Library Links

1. ZLS.GT
2. ODA.GT
3. ODA.ST

DATA STRUCTURE:

EL1 data shall be structured as specified in Appendix B of reference 5. For frequency and PRI this shall consist of a list of free form zone boundaries (Figure B-2, ref. 5) with the trunk numbers present in each zone. For PW only a list of the trunk numbers in each of the fixed zones (32) need be generated. These lists shall form the input to the EL1 generation programs.

EL2 data shall consist of values for the fields of each entry as specified in reference 3. These field values shall form the input to the EL2 generation program. The entries in EL2 shall be ordered according to increasing values of the scan type code - i.e., 1, 2, 3, . . . . Within each scan type the ordering shall be according to increasing values of minimum scan period. (This is not required for the present version of level 2 search, but can save search time if the software is improved.

Since trunks are stored in EL1 and groups are stored in EL2, library linkage tables must be generated to convert from trunks to groups. The data required shall be a list of the trunks from EL1 that are contained in each group in EL2.

EL1 TABLE GENERATION:

The tables for EL1 shall be generated using MACROS written for the MACRO assembler in the PGC. The zone boundary values and the trunk lists shall be entered into a file in the format shown in Figure 1 which is an example of a file called Q TEST.SR. The parameters for the different files shall be as follows:

OPERATOR	OPERAND		
	FREQUENCY	PRI	PW
.ENT	ZLS. F	ZLS. PI	ZLS. PW
.DO	3	3	2
TYPE	F	PI	PW
.END	ZLS. F	ZLS. PI	ZLS. PW

For frequency, the value of the zone boundaries shall be encoded frequency which is:

$$\text{Encoded freq.} = .8 * \text{actual freq.}$$

since the LSB for frequency is 1.25 MHz.

For PW no zone boundary values need be given. Empty zones have no list. Duplicate lists shall be entered as DUPL to conserve ZLS storage.

The MACRO's will produce an assembled listing as shown in Figure 2 for QTEST.SR. A cross reference is produced by the MACRO assembly. Note that the doubled starred (\*\*) lines are not printed out. The MACRO's generate ZLS.(), ODA.(), and ODV.() and store them in a \_\_\_\_\_ .RB file. The command (NOVA 800) to produce the RB file is:

```
MAC      filename      $LPT/L
```

These files shall be converted to AB format as explained below.

0001 .MAIN MACRO REV 02.01

17:12:46 12/14/76

```

01          .NREL
02          .END      ZLS.F
03          000012    .RDX      10
04          0010      .RDXU     16
05
06
07
08          ZLS.F:          ;**** KWC/BV ZONE LISTS ****
09
10          ZONE 0 0
11          ZEND 0
12
13          ZONE 1 2560
14          LIST 1 2 3 4 21 22 23 24 41 42 43 44 61 62 63 64
15          ZEND 1
16 00000'    F000      KW
17 00001'    F000      WD.0
18 00002'    0F00      WD.1
19 00003'    00F0      WD.2
20 00004'    000F      WD.3
21
22          ZONE 2 2816
23          ZEND 2
24
25          ZONE 3 3072
26          LIST 5 6 7 8 25 26 27 28
27          LIST 45 46 47 48 65 66 67 68
28          ZEND 3
29 00005'    E800      KW
30 00006'    0F00      WD.0
31 00007'    00F0      WD.1
32 00008'    000F      WD.2
33 00009'    F000      WD.4
34
35          ZONE 4 3328
36          DUPL 1
37          ZEND 4
38
39          ZONE 5 3584
40          ZEND 5
41
42          ZONE 6 3840
43          DUPL 3
44          ZEND 6
45
46
47
48          ODA.F:          ;**** OUTER-DIRECTORY ADDRESSES ****
49
50
51
52          ZONE 0 0
53          ZEND 0
54 0000A'    FFFF      EMPTY
55
56          ZONE 1 2560
57          LIST 1 2 3 4 21 22 23 24 41 42 43 44 61 62 63 64
58          ZEND 1
59 0000B'    0000      DISPL
60

```



```

0002 .MAIN
01          ZONE 2 2816
02          ZEND 2
03 0000C'   FFFF          EMPTY
04
05          ZONE 3 3072
06          LIST 5 6 7 8 25 26 27 28
07          LIST 45 46 47 48 65 66 67 68
08          ZEND 3
09 0000D'   0005          DISPL
10
11          ZONE 4 3328
12          DUPL 1
13          ZEND 4
14 0000E'   0000          DISPL
15
16          ZONE 5 3584
17          ZEND 5
18 0000F'   FFFF          EMPTY
19
20          ZONE 6 3840
21          DUPL 3
22          ZEND 6
23 00010'   0005          DISPL
24
25
26
27
28 00011'   0007 DDV.F:  ZCI      ;**** OUTER-DIRECTORY VALUES ****
29
30
31          ZONE 0 0
32 00012'   0000          0
33          ZEND 0
34
35          ZONE 1 2560
36 00013'   0A00          2560
37          LIST 1 2 3 4 21 22 23 24 41 42 43 44 61 62 63 64
38          ZEND 1
39
40          ZONE 2 2816
41 00014'   0B00          2816
42          ZEND 2
43
44          ZONE 3 3072
45 00015'   0C00          3072
46          LIST 5 6 7 8 25 26 27 28
47          LIST 45 46 47 48 65 66 67 68
48          ZEND 3
49
50          ZONE 4 3328
51 00016'   0D00          3328
52          DUPL 1
53          ZEND 4
54
55          ZONE 5 3584
56 00017'   0E00          3584
57          ZEND 5
58
59          ZONE 6 3840
60 00018'   0F00          3840

```

FIGURE 2 b.

0005 .MAIN

01

DUPL 3

02

ZEND 6

03

04

05

.END ZLS.F

FIGURE 2C.

## 0004 .MAIN

BASE	000000		1/09	1/12	1/21	1/24	1/34	1/37	1/38
			1/41	1/44	1/45	1/47	1/55	1/59	1/60
			2/04	2/09	2/10	2/13	2/14	2/15	2/19
			2/22	2/23	2/24	2/26	2/34	2/39	2/43
			2/49	2/53	2/54	2/58	3/02	3/03	
BIT	001000		1/15	1/27	1/28	1/58	2/07	2/08	2/36
			2/47	2/48					
CLEAR	000007	MC	1/09	1/47	2/26				
DISPL	000005		1/12	1/21	1/24	1/34	1/37	1/38	1/41
			1/44	1/45	1/55	1/59	1/60	2/04	2/09
			2/10	2/13	2/14	2/15	2/19	2/22	2/23
			2/24	2/34	2/39	2/43	2/49	2/53	2/54
			2/58	3/02	3/03				
DUPL	00018F	MC	1/36	1/43	2/12	2/21	2/52	3/01	
EMPTY	00FFFF		1/09	1/12	1/21	1/24	1/34	1/38	1/41
			1/45	1/51	1/54	1/59	2/03	2/09	2/14
			2/18	2/23	2/30	2/34	2/39	2/43	2/49
			2/54	2/58	3/03				
FL001	000000		1/11	1/12	1/53	1/54	1/55	2/32	2/34
FL002	000001		1/14	1/16	1/21	1/57	1/59	1/60	2/36
			2/39						
FL003	000000		1/23	1/24	2/02	2/03	2/04	2/41	2/43
FL004	000001		1/26	1/29	1/34	2/06	2/09	2/10	2/45
			2/49						
FL005	000002		1/36	1/37	1/38	2/12	2/13	2/14	2/15
			2/51	2/53	2/54				
FL006	000000		1/40	1/41	2/17	2/18	2/19	2/56	2/56
FL007	000002		1/43	1/44	1/45	2/21	2/22	2/23	2/24
			2/60	3/02	3/03				
KW	000000		1/09	1/12	1/15	1/16	1/17	1/24	1/27
			1/28	1/29	1/30	1/38	1/41	1/45	1/47
			1/54	1/58	1/59	2/03	2/07	2/08	2/09
			2/14	2/18	2/23	2/26	2/34	2/38	2/39
			2/43	2/47	2/48	2/49	2/54	2/58	3/03
LIST	0001A1	MC	1/14	1/26	1/27	1/57	2/06	2/07	2/37
			2/46	2/47					
NOT.0	0001CC	MC	1/12	1/16	1/24	1/29	1/38	1/41	1/45
			1/54	1/59	2/03	2/09	2/14	2/18	2/23
			2/34	2/39	2/43	2/49	2/54	2/58	3/03
ODA.F	00000A		1/09	1/48	2/27				
ODV.F	000011		1/09	1/50	2/28				
SE1	000184	MC	1/15	1/27	1/28	1/58	2/07	2/08	2/38
			2/47	2/48					
TRUNK	000043		1/15	1/27	1/28	1/58	2/07	2/08	2/38
			2/47	2/48					
TYPE	00018F	MC	1/07	1/46	2/25				
WD.0	000000		1/09	1/15	1/17	1/18	1/27	1/28	1/30
			1/31						
WD.1	000000		1/09	1/15	1/18	1/19	1/27	1/28	1/31
			1/32						
WD.2	000000		1/09	1/15	1/19	1/20	1/27	1/28	1/32
			1/33						
WD.3	000000		1/09	1/15	1/20	1/21	1/27	1/28	1/33
WD.4	000000		1/09	1/15	1/21	1/27	1/28	1/33	1/34
WD.5	000000		1/09	1/15	1/21	1/27	1/28	1/34	
WD.6	000000		1/09	1/15	1/21	1/27	1/28	1/34	
WD.7	000000		1/09	1/15	1/21	1/27	1/28	1/34	
WD.8	000000		1/09	1/15	1/21	1/27	1/28	1/34	
WD.9	000000		1/09	1/15	1/21	1/27	1/28	1/34	

## 0005 .MAIN

WORD	000004	1/15	1/27	1/28	1/58	2/07	2/08	2/38
		2/47	2/48					
ZCT	000007	1/09	1/11	1/12	1/14	1/16	1/21	1/23
		1/24	1/26	1/29	1/34	1/36	1/37	1/38
		1/40	1/41	1/43	1/44	1/45	1/50	1/51
		1/53	1/54	1/55	1/57	1/59	1/60	2/02
		2/03	2/04	2/06	2/09	2/10	2/12	2/13
		2/14	2/15	2/17	2/18	2/19	2/21	2/22
		2/23	2/24	2/28	2/30	2/32	2/34	2/36
		2/39	2/41	2/43	2/45	2/49	2/51	2/53
		2/54	2/56	2/58	2/60	3/02	3/03	
ZEND	000100 MC	1/11	1/15	1/23	1/28	1/37	1/40	1/44
		1/53	1/58	2/02	2/08	2/13	2/17	2/22
		2/33	2/38	2/42	2/48	2/53	2/57	3/02
ZLS.F	000000' EN	1/02	1/08	1/47	2/26	3/05		
ZN.0	000000'	1/11	1/12	1/53	1/55	2/32	2/34	
ZN.1	000000'	1/14	1/21	1/37	1/57	1/59	1/60	2/13
		2/36	2/39	2/53				
ZN.2	000005'	1/23	1/24	2/02	2/04	2/41	2/43	
ZN.3	000005'	1/26	1/34	1/44	2/06	2/09	2/10	2/22
		2/45	2/49	3/02				
ZN.4	00000A'	1/36	1/38	2/12	2/14	2/15	2/51	2/54
ZN.5	00000A'	1/40	1/41	2/17	2/19	2/56	2/58	
ZN.6	00000A'	1/43	1/45	2/21	2/23	2/24	2/60	3/03
ZONE	000194 MC	1/10	1/13	1/22	1/25	1/35	1/39	1/42
		1/52	1/56	2/01	2/05	2/11	2/16	2/20
		2/31	2/35	2/40	2/44	2/50	2/55	2/59
?I	000001	1/09	1/15	1/17	1/18	1/19	1/20	1/21
		1/27	1/28	1/30	1/31	1/32	1/33	1/34
		1/58	2/07	2/08	2/38	2/47	2/48	
?J	00000B	1/15	1/27	1/28				
?K	000004	1/06	1/08	1/09	1/11	1/12	1/14	1/15
		1/16	1/21	1/23	1/24	1/26	1/27	1/28
		1/29	1/34	1/36	1/37	1/38	1/40	1/41
		1/43	1/44	1/45	1/46	1/47	1/48	1/50
		1/53	1/54	1/55	1/57	1/58	1/59	1/60
		2/02	2/03	2/04	2/06	2/07	2/08	2/09
		2/10	2/12	2/13	2/14	2/15	2/17	2/18
		2/19	2/21	2/22	2/23	2/24	2/25	2/26
		2/27	2/28	2/32	2/34	2/36	2/38	2/39
		2/41	2/43	2/45	2/47	2/48	2/49	2/51
		2/53	2/54	2/56	2/58	2/60	3/02	3/03
		3/04						

FIGURE 2 R.

## EL2 DATA GENERATION:

The data for EL2 shall be entered into a file using the MARO's as shown in Figure 3 for a single EL2 entry. The sequence from EL2 to E2END shall be repeated for each entry in EL2. The .RDX for this input shall always be 10 (decimal). Only non-zero words need be entered. The arguments represent the values of defined fields in each word. The MACRO's will check to ensure that the correct number of arguments are input for that word.

The MACRO's will produce an assembled listing as shown in Figure 4 and a \_\_\_\_\_.RB file. The command (NOVA 800) to produce the RF file is:

```
MAC      filename      $LPT/L
```

The RB file shall be converted to AB format as explained below.

```

      .INREL
      .END      EL21
      .RDX      10
      .RDX0     10

EL21:  EL2
      E2WD 0   1 0
      E2WD 1   5 11
      E2WD 2   0 0 0 1
      E2WD 3   1 1023
      E2WD 5   6 0 35
      E2WD 6   2 0 0
      E2END

      .END      EL21

```

FIGURE 3. EXAMPLE OF FILE FOR EL2 DATA

```
01      .NRRL
02      .ENT      EL21
03      000012    .RDX      10
04      0010      .RDX0     16
05
06      EL21:     EL2
07      E2WD 0    1 0
08      E2WD 1    5 11
09      ;***** ERROR: TOO FEW ARGUMENTS FOR WORD 1 *****
10      E2WD 2    0 0 0 1
11      E2WD 3    1 1023
12      E2WD 5    6 0 35
13      E2WD 6    2 0 0
14      E2END
15 00000' 1000    WD.0
16 00002' 0001    WD.2
17 00003' 15FF    WD.3
18 00005' 6023    WD.5
19 00006' 2000    WD.6
20
21      .END      EL21
```

FIGURE 4. ASSEMBLY LISTING FOR EL2 DATA

## LIBRARY LINKS:

The ZLS.GT and ODA.GT files shall be generated in a manner similar to that for ZLS.PW and ODA.PW. An example of a file created for this purpose is given in Figure 5. Note that the end of the DO loop has a value of 4 for ?K.

The MARCO's will produce an assembled listing as shown in Figure 6 and a \_\_\_\_\_ .RB file. The command (NOVA 800) to produce the RB file is:

MAC            filename        \$LPT/L

The RB file shall be converted to AB format as explained below.

The ODA.ST table contains the emitter library number (ELN) of the first entry of each scan type (Reference 2). There is provision for 16 different scan types although only 1 - 4 are presently implemented. The entry for scan type zero is don't care. An example of ODA.ST is as follows:

0	XXXX
1	1
2	16
3	25
4	36
5	51
⋮	⋮
15	51

## CONVERSION TO AB FORMAT:

The conversion from relocatable binary (RB) format to absolute binary (AB) format that can be loaded with the operational code is done as follows:

1. Revise EL1.MS to pick the correct values for NFRQ and NPRI and to reserve enough space for ZLS.( ), ODA.( ),



```

.NREL
.ENT    ZLS.GI
.RDX    10
.RDXD   16

**      ?K = 1

**      .DU    2
**      TYPE   GI

ZONE 1
LIST 27
ZEND 1

ZONE 2
LIST 26
ZEND 2

ZONE 3
LIST 1
ZEND 3

ZONE 4
DUPL 2
ZEND 4

ZONE 5
LIST 28 29 30
ZEND 5

ZONE 6
LIST 4 5
ZEND 6

ZONE 7
LIST 29
ZEND 7

ZONE 8
LIST 1 2 3
ZEND 8

ZONE 9
LIST 5
ZEND 9

**      ?K = 4
**      .ENDC

.END    ZLS.GI

```

FIGURE 5. EXAMPLE OF FILE FOR LIBRARY LINKS

```

01          .NREL
02          .ENT      ZLS.GI
03          000012    .RDX      10
04          0010     .RDX0     16
05
06
07
08          ZLS.GI:      ;**** KWC/BV ZONE LISTS ****
09
10          ZONE 1
11          LIST 27
12          ZEND 1
13 00000' 4000      KW
14 00001' 0020      WD.1
15
16          ZONE 2
17          LIST 26
18          ZEND 2
19 00002' 4000      KW
20 00003' 0040      WD.1
21
22          ZONE 3
23          LIST 1
24          ZEND 3
25 00004' 6000      KW
26 00005' 8000      WD.0
27
28          ZONE 4
29          DUPL 2
30          ZEND 4
31
32          ZONE 5
33          LIST 28 29 30
34          ZEND 5
35 00006' 4000      KW
36 00007' 0010      WD.1
37
38          ZONE 6
39          LIST 4 5
40          ZEND 6
41 00008' 8000      KW
42 00009' 1800      WD.0
43
44          ZONE 7
45          LIST 29
46          ZEND 7
47 0000A' 4000      KW
48 0000B' 0008      WD.1
49
50          ZONE 8
51          LIST 1 2 3
52          ZEND 8
53 0000C' 6000      KW
54 0000D' E000      WD.0
55
56          ZONE 9
57          LIST 5
58          ZEND 9
59 0000E' 6000      KW
60 0000F' 0000      WD.0

```

```

0002 .MAIN
01
02
03
04
05
06 00010' 0009 ODA.GI: ZCI      ;**** OUTER-DIRECTORY ADDRESSES ****
07
08
09          ZONE 1
10          LIST 27
11          ZEND 1
12 00011' 0000          DISPL
13
14          ZONE 2
15          LIST 26
16          ZEND 2
17 00012' 0004          DISPL
18
19          ZONE 3
20          LIST 1
21          ZEND 3
22 00013' 0008          DISPL
23
24          ZONE 4
25          DUPL 2
26          ZEND 4
27 00014' FFFA          DISPL
28
29          ZONE 5
30          LIST 28 29 30
31          ZEND 5
32 00015' 0000          DISPL
33
34          ZONE 6
35          LIST 4 5
36          ZEND 6
37 00016' 0010          DISPL
38
39          ZONE 7
40          LIST 29
41          ZEND 7
42 00017' 0014          DISPL
43
44          ZONE 8
45          LIST 1 2 3
46          ZEND 8
47 00018' 0018          DISPL
48
49          ZONE 9
50          LIST 5
51          ZEND 9
52 00019' 0010          DISPL
53
54
55          .END      ZLS.GI

```

FIGURE 6b.

and ODV.( ) for frequency and PRI. For PW, the length of ZLS.PW shall be reserved, but ODA.PW shall always be 32 locations.

2. Revise LIBLINK.MS to pick the correct value for NGRP and to reserve enough space for ZLS.GT.
3. In both 1. and 2. the order of the tables shall be ZLS, ODA, and ODV (if required). EL1.MS and LIBLINK.MS shall be revised to accommodate this ordering if not already done.
4. Make sure that enough space is reserved for EL2 data.
5. The program shall be reassembled to determine the starting and ending locations for each file. The NOVA 800 command for assembly is:

META/X RP16/S filename,...filename \$LPT/L

6. From step 5 find the address of the first location for a file - e.g., ZLS.F - and the address of the last address for a file - e.g., last address of ODV.F. This shall be done for each separate file created. (Contiguous files may be combined into a single file). Express the first addr FADDR<sub>16</sub> and the last address LADDR<sub>16</sub> in octal as faddr and laddr respectively.
7. Create a save file \_\_\_\_\_. SV for each RB file by using the following NOVA 800 command:

RLDR/Z faddr/N filename X/L;MAP/D X

8. Create an absolute binary file \_\_\_\_\_.AB for each SV file by using the following NOVA 800 command:

MKABS/Z faddr/F laddr/T filename.SV filename.AB

9. To obtain a hexadecimal listing of the AB file use the following NOVA 800 command:

BLOOK/H filename.AB

10. The program and the new library data shall be loaded via serial line or paper tape. If AB format is acceptable, a paper tape in AB format may be obtained by using the NOVA 2 command:

BPUNCH filename.AB

If BQ format is required, then a conversion through MATS must be done before loading the RP-16.

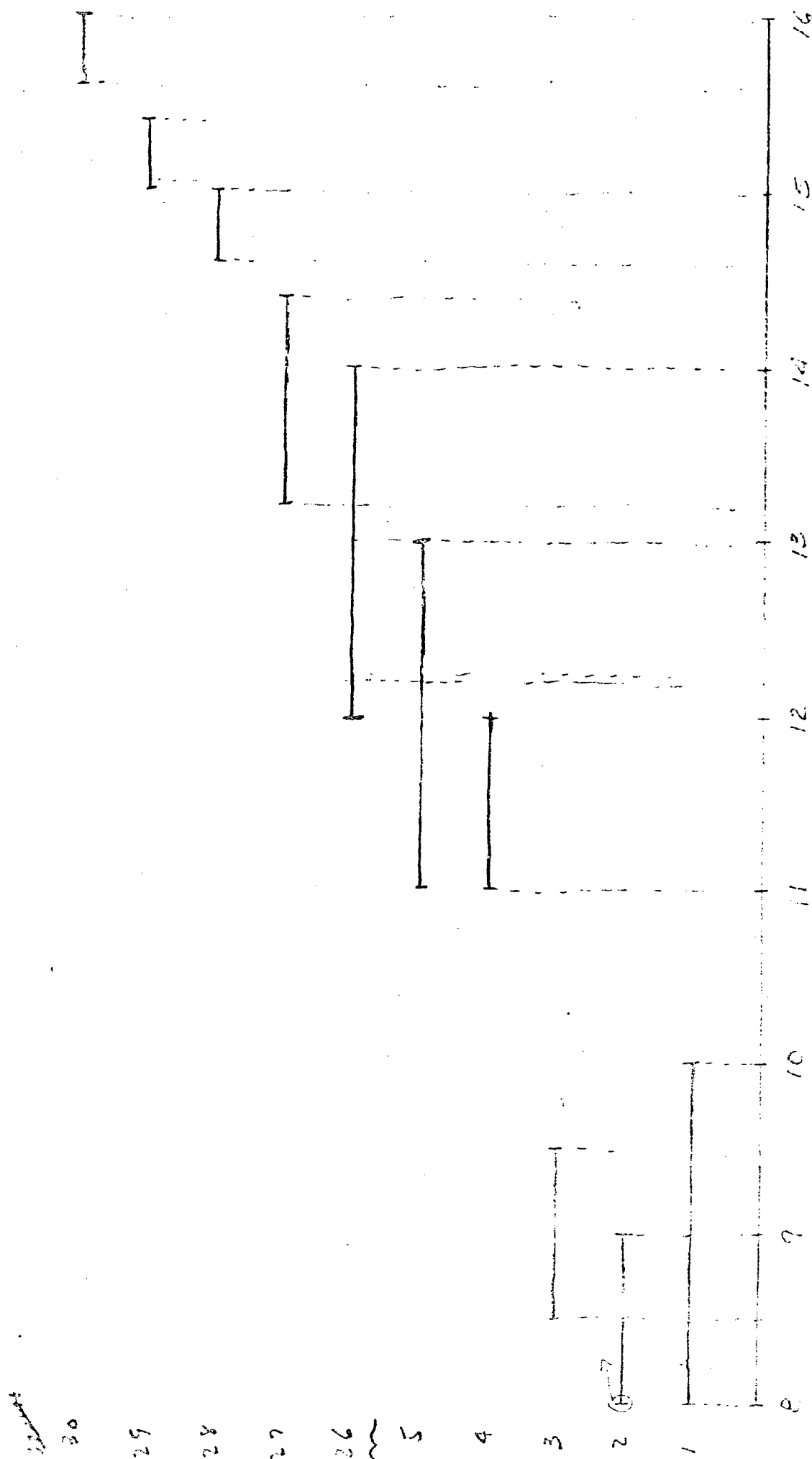
#### LIBRARY EXAMPLE:

A complete library example from initial data through the creation of AB format data is attached. The initial data contains 14 different emitter/modes - i.e., 14 unique combinations of frequency, PRI, PW, and scan period ranges, scan type, ECM technique, and identification code. The initial data listings are shown in Figure 7 ordered according to increasing value of minimum frequency. Of the 14 entries there are 10 distinct trunks which have been arbitrarily given trunk numbers 1-5 and 26-30 (to obtain words 1 and/or 2 in the ZLS table). The EL2 classification on scan type min. and max. scan period, ECM technique, and identification yields 9 groups which are ordered by increasing scan code 1 = circular, 2 = sector, 3 = conscan, and 4 = steady.

The resulting EL2 data entries have min scan =  $\emptyset$  and max scan = 3FF because there is no scan period measurement in the IEWS, ADM, Priority 1 code. If scan period is incorporated at some time in the future, then the min and max scan values would correspond to those given in Figure 7.

ID	Min. Freq.	Max. Freq.	Min. Pri	Max. Pri	Min. PW	Max. PW	Scan Type	Min. Scan Prd.	Max. Scan Prd.	ECM Tech
101	8000	9000	1000	1040	.9	1.05	STDY	0.0	0.0	2
635 A	8000	10012	895	1103	1.0	1.1	STDY	0.0	0.0	2
635 B	8000	10012	895	1103	1.0	1.1	SECT	.016	.032	126
225	8500	9500	800	1200	.8	1.05	STDY	0.0	0.0	2
416	11000	12000	560	840	.5	.7	CONS	.02	.04	71
153 A	11000	13000	1160	1240	.625	.7	STDY	0.0	0.0	12
153 B	11000	13000	1160	1240	.625	.7	CONS	.02	.04	71
196 A	12000	14000	1040	1080	.65	.775	SECT	.025	.050	117
196 B	12000	14000	1040	1080	.65	.775	CIRC	2.0	4.0	82
302	13207	14400	840	1200	.4	.675	CIRC	0.5	1.5	35
118	14600	15103	1600	1800	.2	.3	SECT	.064	.075	166
253 A	15103	15400	440	600	.2	.4	CONS	.03	.05	50
253 B	15103	15400	440	600	.2	.4	SECT	.064	.075	166
512	15600	16000	521	760	.3	.4	SECT	.064	.075	166

Figure 7. Example of Initial Library Data



FREQUENCY, GHz



ODV.F

2LS.F

ODV.F		↓	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	2LS.F
1 7 0 8 0 0	EMPTY	-1	1																0 8 0 0 0
2 8 0 0 0 0	1, 2	0	1	1															0 0 0 0
3 8 0 0 0 0	1, 2, 3	2	1																2 8 0 0 0
4 9 0 0 0 0	1, 3	4	1	1	1														0 0 0 0
5 9 0 0 0 0	1	6	1																4 8 0 0 0
6 1 0 0 1 2	EMPTY	-1	1		1														0 0 0 0
7 1 1 0 0 0	4, 5	8	1																6 8 0 0 0
8 1 2 0 0 0	4, 5, 26	10	1																8 0 0 0
9 9 0 0 1 0	5, 26	13	1																8 8 0 0 0
10 1 3 0 0 0	26	16			1	1													1 8 0 0
11 1 3 2 0 0	26, 27	18	1	1															10 0 0 0
12 1 4 0 0 0	27	20			1	1													1 8 0 0
13 1 4 0 0 0	EMPTY	-1									1								0 0 4 0
14 1 4 0 0 0	28	22	1	1															13 0 0 0
15 1 5 1 0 3	28, 29	24				1													0 8 0 0
16 1 5 1 0 3	29	26									1								0 0 4 0
17 1 5 4 0 0	EMPTY	-1		1															16 4 0 0 0
18 1 5 4 0 0	30	28									1								0 0 4 0
19 1 6 0 0 1	EMPTY	-1		1															18 4 0 0 0
											1	1							0 0 6 0
				1															20 4 0 0 0
												1							0 0 2 0
				1															22 4 0 0 0
												1							0 0 1 0
				1															24 4 0 0 0
												1	1						0 0 1 8
				1															26 4 0 0 0
													1						0 0 0 8
				1															28 4 0 0 0
																1			0 0 0 4

N.F = 19

Encoded freq =

2.8 \* Actual freq

01			.NREL	
02			.ENI	ZLS.F
03	000012		.RDX	10
04	0010		.RDXU	16
05				
06				
07		ZLS.F:		;**** KWC/BV ZONE LISTS ****
08				
09			ZONE 0 0	
10			ZEND 0	
11				
12			ZONE 1 6400	
13			LIST 1 2	
14			ZEND 1	
15	000001	8000	KW	
16	000011	0000	WD.0	
17				
18			ZONE 2 6800	
19			LIST 1 2 3	
20			ZEND 2	
21	000002	8000	KW	
22	000003	0000	WD.0	
23				
24			ZONE 3 7200	
25			LIST 1 3	
26			ZEND 3	
27	000004	8000	KW	
28	000005	0000	WD.0	
29				
30			ZONE 4 7600	
31			LIST 1	
32			ZEND 4	
33	000006	8000	KW	
34	000007	8000	WD.0	
35				
36			ZONE 5 8010	
37			ZEND 5	
38				
39			ZONE 6 8800	
40			LIST 4 5	
41			ZEND 6	
42	000008	8000	KW	
43	000009	1800	WD.0	
44				
45			ZONE 7 9600	
46			LIST 4 5 26	
47			ZEND 7	
48	00000A	0000	KW	
49	00000B	1800	WD.0	
50	00000C	0040	WD.1	
51				
52			ZONE 8 9601	
53			LIST 5 26	
54			ZEND 8	
55	00000D	0000	KW	
56	00000E	0800	WD.0	
57	00000F	0040	WD.1	
58				
59			ZONE 9 10400	
60			LIST 26	

0002 .MAIN

01			ZEND 9
02	00010'	4000	KW
03	00011'	0040	WD.1
04			
05			ZONE 10 10566
06			LIST 26 27
07			ZEND 10
08	00012'	4000	KW
09	00013'	0060	WD.1
10			
11			ZONE 11 11200
12			LIST 27
13			ZEND 11
14	00014'	4000	KW
15	00015'	0020	WD.1
16			
17			ZONE 12 11520
18			ZEND 12
19			
20			ZONE 13 11680
21			LIST 28
22			ZEND 13
23	00016'	4000	KW
24	00017'	0010	WD.1
25			
26			ZONE 14 12082
27			LIST 28 29
28			ZEND 14
29	00018'	4000	KW
30	00019'	0018	WD.1
31			
32			ZONE 15 12085
33			LIST 29
34			ZEND 15
35	0001A'	4000	KW
36	0001B'	0008	WD.1
37			
38			ZONE 16 12320
39			ZEND 16
40			
41			ZONE 17 12480
42			LIST 30
43			ZEND 17
44	0001C'	4000	KW
45	0001D'	0004	WD.1
46			
47			ZONE 18 12801
48			ZEND 18
49			
50			
51			

00A.F:

;\*\*\*\* OUTER-DIRECTORY ADDRESSES \*\*\*\*

52			
53			
54			
55			
56			ZONE 0 0
57			ZEND 0
58	0001E'	FFFF	EMPTY
59			
60			ZONE 1 6400

## 0003 .MAIN

01		LIST 1 2
02		ZEND 1
03	0001F' 0000	DISPL
04		
05		ZONE 2 6800
06		LIST 1 2 3
07		ZEND 2
08	00020' 0002	DISPL
09		
10		ZONE 3 7200
11		LIST 1 3
12		ZEND 3
13	00021' 0004	DISPL
14		
15		ZONE 4 7600
16		LIST 1
17		ZEND 4
18	00022' 0006	DISPL
19		
20		ZONE 5 8010
21		ZEND 5
22	00023' FFFF	EMPTY
23		
24		ZONE 6 8800
25		LIST 4 5
26		ZEND 6
27	00024' 0008	DISPL
28		
29		ZONE 7 9600
30		LIST 4 5 26
31		ZEND 7
32	00025' 000A	DISPL
33		
34		ZONE 8 9601
35		LIST 5 26
36		ZEND 8
37	00026' 0000	DISPL
38		
39		ZONE 9 10400
40		LIST 26
41		ZEND 9
42	00027' 0010	DISPL
43		
44		ZONE 10 10566
45		LIST 26 27
46		ZEND 10
47	00028' 0012	DISPL
48		
49		ZONE 11 11200
50		LIST 27
51		ZEND 11
52	00029' 0014	DISPL
53		
54		ZONE 12 11520
55		ZEND 12
56	0002A' FFFF	EMPTY
57		
58		ZONE 13 11680
59		LIST 28
60		ZEND 13

0005 .MAIN		
01	00038'	2260
02		
03		
04		
05		
06	00039'	2580
07		
08		
09		
10		
11	0003A'	2581
12		
13		
14		
15		
16	0003B'	2840
17		
18		
19		
20		
21	0003C'	2946
22		
23		
24		
25		
26	0003D'	2800
27		
28		
29		
30		
31	0003E'	2000
32		
33		
34		
35	0003F'	20A0
36		
37		
38		
39		
40	00040'	2F32
41		
42		
43		
44		
45	00041'	2F33
46		
47		
48		
49		
50	00042'	3020
51		
52		
53		
54	00043'	3000
55		
56		
57		
58		
59	00044'	3201
60		

8800
LIST 4 5
ZEND 6
ZONE 7 9600
9600
LIST 4 5 26
ZEND 7
ZONE 8 9601
9601
LIST 5 26
ZEND 8
ZONE 9 10400
10400
LIST 26
ZEND 9
ZONE 10 10566
10566
LIST 26 27
ZEND 10
ZONE 11 11200
11200
LIST 27
ZEND 11
ZONE 12 11520
11520
ZEND 12
ZONE 13 11680
11680
LIST 28
ZEND 13
ZONE 14 12082
12082
LIST 28 29
ZEND 14
ZONE 15 12083
12083
LIST 29
ZEND 15
ZONE 16 12320
12320
ZEND 16
ZONE 17 12480
12480
LIST 30
ZEND 17
ZONE 18 12801
12801
ZEND 18

0006 .MAIN

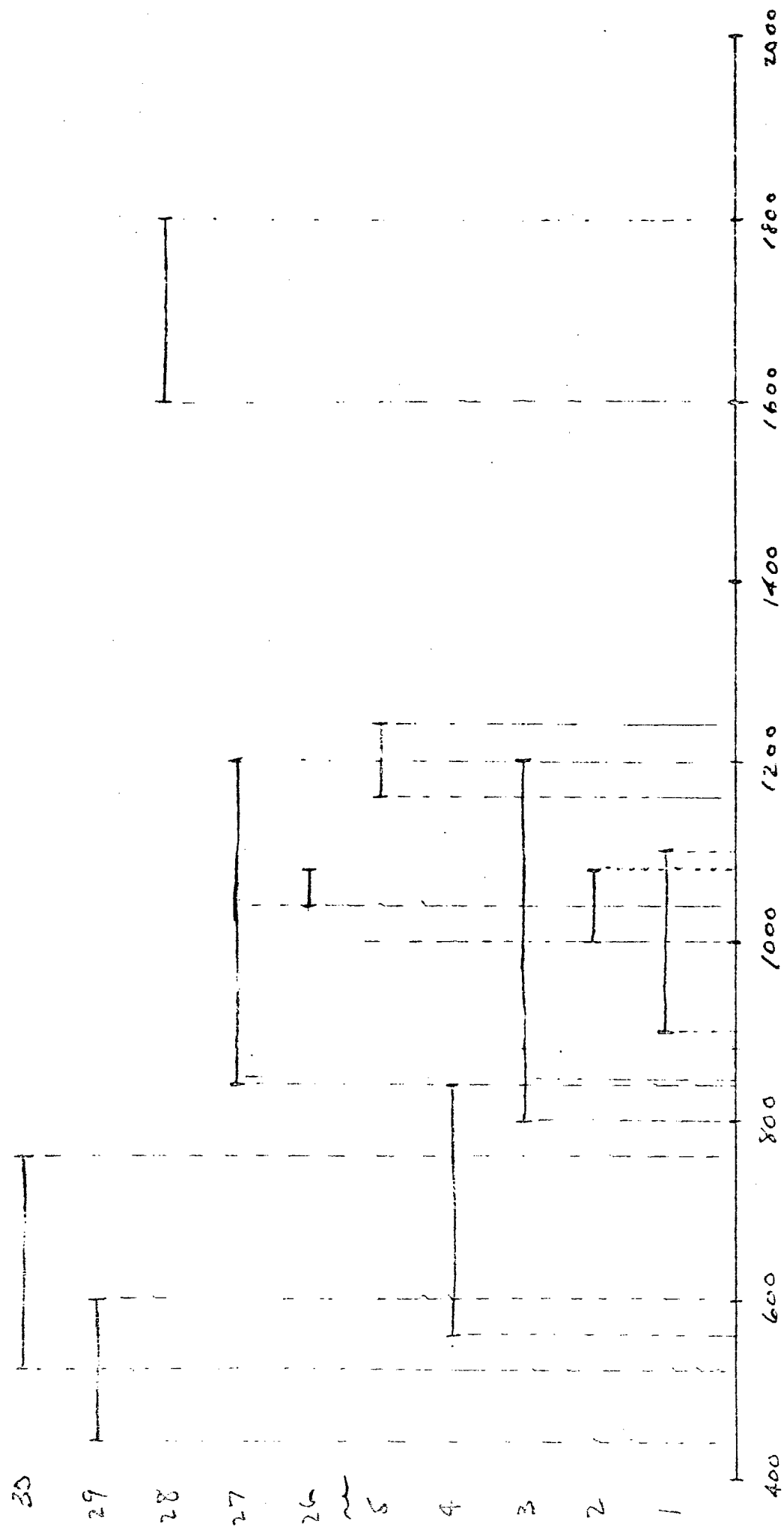
01

02

03

.END

ZLS.F



PRI,  $\mu$ sec

ELI PRI

STEVE: LTRPT 1.5R

	ODV.PI	TRUNKS	ODA.PI	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		ZLS.PI
1	400	EMPTY	-1	1																0	4000
2	440	29	0													1					0008
3	521	29,30	2	1																2	4000
4	560	4,29,30	4													1	1				0000
5	600	4,30	7	1	1															4	0000
6	760	4	10				1														1000
7	800	3,4	12	1	1															7	0000
8	840	3,4,27	14				1														1000
9	841	3,27	17	1																10	8000
10	895	1,3,27	20				1														1000
(11)	1000	1,2,3,27	23	1																12	8000
(12)	1040	1,2,3,26,27	26			1	1														3000
13	1080	1,3,27	20	1	1															14	0000
14	1103	3,27	17				1	1													3000
15	1160	3,5,27	29	1	1																0020
16	1200	5	32				1													17	0000
17	1240	EMPTY	-1																		2000
18	1600	28	34	1	1																0020
19	1800	EMPTY	-1	1		1															2000
																					0020
				1	1																2300
				1	1	1															0000
																					0020
				1	1																2600
				1	1	1															0000
																					0060
				1	1																2700
						1															2000
																					0020
				1	1																2900
						1															2800
																					0020
				1																	3200
						1															0800
																					4000
						1															0010

N.PI=19



01		.NREL	
02		.ENT	ZLS.PI
03	000012	.RDX	10
04	0010	.RDX0	16
05			
06			
07			

ZLS.PI: ;\*\*\*\* KWL/BV ZONE LISTS \*\*\*\*

10		ZONE 1 000
11		ZEND 1
12		
13		ZONE 2 440
14		LIST 29
15		ZEND 2
16	00000' 4000	KW
17	00001' 0008	WD.1
18		
19		ZONE 3 521
20		LIST 29 30
21		ZEND 3
22	00002' 4000	KW
23	00003' 000C	WD.1
24		
25		ZONE 4 560
26		LIST 4 29 30
27		ZEND 4
28	00004' C000	KW
29	00005' 1000	WD.0
30	00006' 000C	WD.1
31		
32		ZONE 5 600
33		LIST 4 30
34		ZEND 5
35	00007' C000	KW
36	00008' 1000	WD.0
37	00009' 0004	WD.1
38		
39		ZONE 6 760
40		LIST 4
41		ZEND 6
42	0000A' 8000	KW
43	0000B' 1000	WD.0
44		
45		ZONE 7 800
46		LIST 3 4
47		ZEND 7
48	0000C' 8000	KW
49	0000D' 3000	WD.0
50		
51		ZONE 8 840
52		LIST 3 4 27
53		ZEND 8
54	0000E' C000	KW
55	0000F' 3000	WD.0
56	00010' 0020	WD.1
57		
58		ZONE 9 841
59		LIST 3 27
60		ZEND 9

```

0002 .MAIN
01 00011' C000 KW
02 00012' 2000 WD.0
03 00013' 0020 WD.1
04
05 ZONE 10 845
06 LIST 1 3 27
07 ZEND 10
08 00014' C000 KW
09 00015' A000 WD.0
10 00016' 0020 WD.1
11
12 ZONE 11 1000
13 LIST 1 2 3 27
14 ZEND 11
15 00017' C000 KW
16 00018' E000 WD.0
17 00019' 0020 WD.1
18
19 ZONE 12 1040
20 LIST 1 2 3 26 27
21 ZEND 12
22 0001A' C000 KW
23 0001B' E000 WD.0
24 0001C' 0060 WD.1
25
26 ZONE 13 1080
27 DUPL 10
28 ZEND 13
29
30 ZONE 14 1103
31 DUPL 9
32 ZEND 14
33
34 ZONE 15 1160
35 LIST 3 5 27
36 ZEND 15
37 0001D' C000 KW
38 0001E' 2800 WD.0
39 0001F' 0020 WD.1
40
41 ZONE 16 1200
42 LIST 5
43 ZEND 16
44 00020' 8000 KW
45 00021' 0800 WD.0
46
47 ZONE 17 1240
48 ZEND 17
49
50 ZONE 18 1600
51 LIST 28
52 ZEND 18
53 00022' 4000 KW
54 00023' 0010 WD.1
55
56 ZONE 19 1800
57 ZEND 19
58
59 .ENDC
60

```

0005 .MAIN

01

02

00A.PI:

;\*\*\*\* OUTER-DIRECTORY ADDRESSES \*\*\*\*

03

04

05

06

ZONE 1 000

07

ZEND 1

08 00024' FFFF

EMPTY

09

10

ZONE 2 440

11

LIST 29

12

ZEND 2

13 00025' 0000

DISPL

14

15

ZONE 3 521

16

LIST 29 30

17

ZEND 3

18 00026' 0002

DISPL

19

20

ZONE 4 560

21

LIST 4 29 30

22

ZEND 4

23 00027' 0004

DISPL

24

25

ZONE 5 600

26

LIST 4 30

27

ZEND 5

28 00028' 0007

DISPL

29

30

ZONE 6 760

31

LIST 4

32

ZEND 6

33 00029' 000A

DISPL

34

35

ZONE 7 800

36

LIST 3 4

37

ZEND 7

38 0002A' 000C

DISPL

39

40

ZONE 8 840

41

LIST 3 4 27

42

ZEND 8

43 0002B' 000E

DISPL

44

45

ZONE 9 841

46

LIST 3 27

47

ZEND 9

48 0002C' 0011

DISPL

49

50

ZONE 10 895

51

LIST 1 3 27

52

ZEND 10

53 0002D' 0014

DISPL

54

55

ZONE 11 1000

56

LIST 1 2 3 27

57

ZEND 11

58 0002E' 0017

DISPL

59

60

ZONE 12 1040

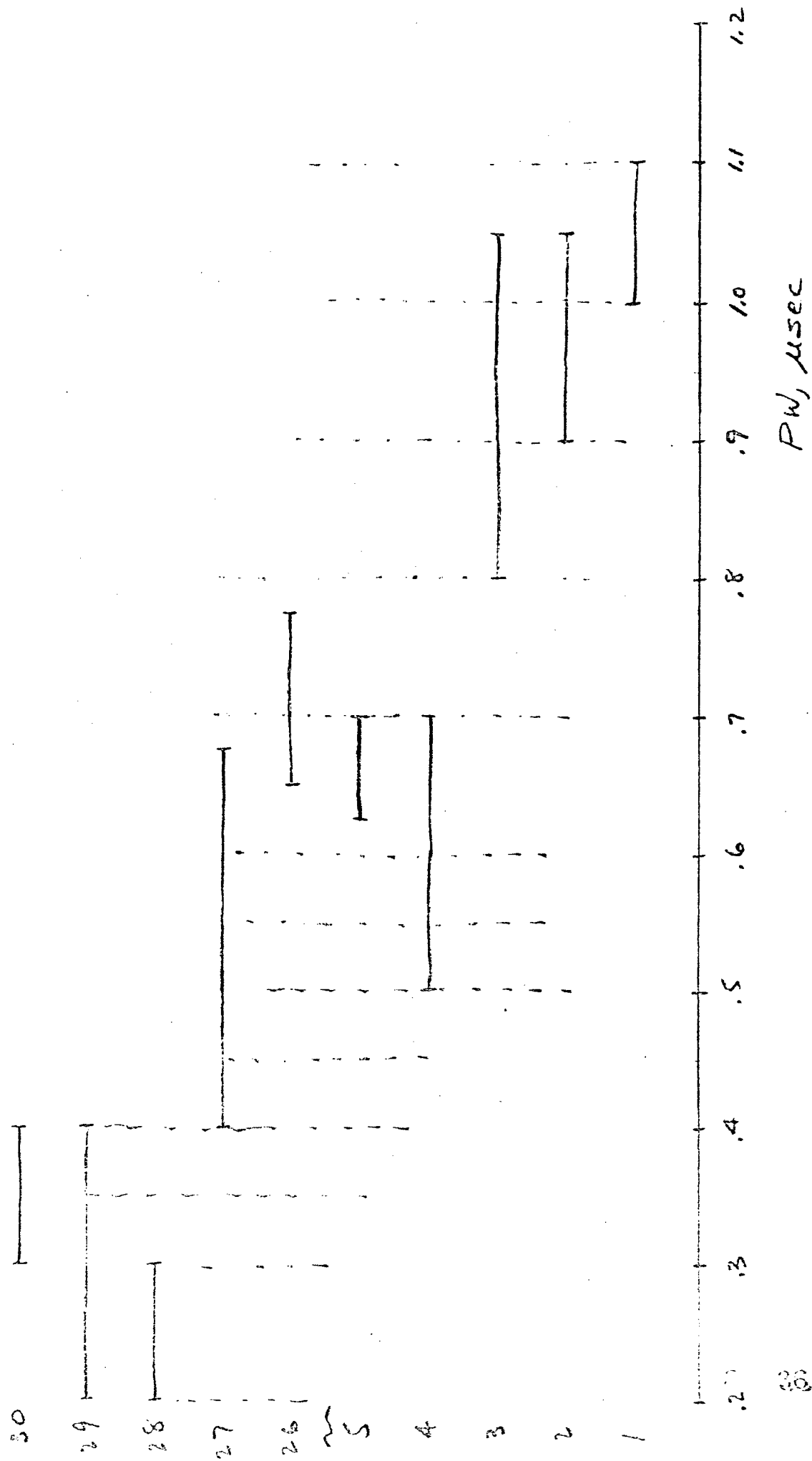
```

0004 .MAIN
01          LIST 1 2 3 26 27
02          ZEND 12
03 0002F'   001A      DISPL
04
05          ZONE 13 1080
06          DUPL 10
07          ZEND 13
08 00030'   0014      DISPL
09
10          ZONE 14 1103
11          DUPL 9
12          ZEND 14
13 00031'   0011      DISPL
14
15          ZONE 15 1160
16          LIST 3 5 27
17          ZEND 15
18 00032'   0010      DISPL
19
20          ZONE 16 1200
21          LIST 5
22          ZEND 16
23 00033'   0020      DISPL
24
25          ZONE 17 1240
26          ZEND 17
27 00034'   FFFF      EMPTY
28
29          ZONE 18 1600
30          LIST 28
31          ZEND 18
32 00035'   0022      DISPL
33
34          ZONE 19 1800
35          ZEND 19
36 00036'   FFFF      EMPTY
37
38          .ENDC
39
40
41
42 00037'   0013 00V.PI: ZCT      ;**** OUTER-DIRECTORY VALUES ****
43
44
45          ZONE 1 000
46 00038'   0000      000
47          ZEND 1
48
49          ZONE 2 440
50 00039'   0188      440
51          LIST 29
52          ZEND 2
53
54          ZONE 3 521
55 0003A'   0209      521
56          LIST 29 30
57          ZEND 3
58
59          ZONE 4 560
60 0003B'   0230      560

```

0005 .MAIN		
01		LIST 4 29 30
02		ZEND 4
03		
04		ZONE 5 600
05	0003C' 0258	600
06		LIST 4 30
07		ZEND 5
08		
09		ZONE 6 760
10	0003D' 02F8	760
11		LIST 4
12		ZEND 6
13		
14		ZONE 7 800
15	0003E' 0320	800
16		LIST 3 4
17		ZEND 7
18		
19		ZONE 8 840
20	0003F' 0348	840
21		LIST 3 4 27
22		ZEND 8
23		
24		ZONE 9 841
25	00040' 0349	841
26		LIST 3 27
27		ZEND 9
28		
29		ZONE 10 895
30	00041' 037F	895
31		LIST 1 3 27
32		ZEND 10
33		
34		ZONE 11 1000
35	00042' 03E8	1000
36		LIST 1 2 3 27
37		ZEND 11
38		
39		ZONE 12 1040
40	00043' 0410	1040
41		LIST 1 2 3 26 27
42		ZEND 12
43		
44		ZONE 13 1080
45	00044' 0438	1080
46		DUPL 10
47		ZEND 13
48		
49		ZONE 14 1103
50	00045' 044F	1103
51		DUPL 9
52		ZEND 14
53		
54		ZONE 15 1160
55	00046' 0488	1160
56		LIST 3 5 27
57		ZEND 15
58		
59		ZONE 16 1200
60	00047' 0480	1200

0006 .MAIN	
01	LIST 5
02	ZEND 16
03	
04	ZONE 17 1240
05 00048' 0408	1240
06	ZEND 17
07	
08	ZONE 18 1600
09 00049' 0640	1600
10	LIST 28
11	ZEND 18
12	
13	ZONE 19 1800
14 0004A' 0708	1800
15	ZEND 19
16	
17	.ENDC
18	
19	.END ZLS.P1



ELI - PW

STEVE: LIBP1.SR

	TRUNKS	ODA.PW	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		ELS.PW
0	EMPTY	-1	1															0	4 0 0 0
1	28, 29	0										1	1					2	0 0 1 8
2	29, 30	2	1															4	4 0 0 0
3	29, 30	2												1	1				0 0 0 0
4	27	4	1															4	4 0 0 0
5	27	4										1							0 0 2 0
6	4, 27	6	1	1														6	0 0 0 0
7	4, 27	6			1														1 0 0 0
8	4, 5, 26	9										1							0 0 2 0
9	26	12	1	1														9	0 0 0 0
10	3	14			1	1													1 8 0 0
11	2, 3	16								1									0 0 4 0
12	1, 2, 3	18	1															12	4 0 0 0
13	EMPTY	-1								1									0 0 4 0
14		-1	1															14	8 0 0 0
15					1														2 0 0 0
16			1															16	8 0 0 0
17				1	1														6 0 0 0
18			1															18	8 0 0 0
19			1	1	1														8 0 0 0
20																			
21																			
22																			
23																			
24																			
25																			
26																			
27																			
28																			
29																			
30																			
31	EMPTY	-1																	



01			.INREL	
02			.ENT	ZLS.P
03	000012		.RDX	10
04	0010		.RDXU	16
05				
06				
07				
08		ZLS.P:		;**** KWC/BV ZONE LISTS ****
09				
10			ZONE 0	
11			ZEND 0	
12				
13			ZONE 1	
14			LIST 28 29	
15			ZEND 1	
16	000001	4000	KW	
17	000011	0018	WD.1	
18				
19			ZONE 2	
20			LIST 29 30	
21			ZEND 2	
22	000021	4000	KW	
23	000031	000C	WD.1	
24				
25			ZONE 3	
26			DUPL 2	
27			ZEND 3	
28				
29			ZONE 4	
30			LIST 27	
31			ZEND 4	
32	000041	4000	KW	
33	000051	0020	WD.1	
34				
35			ZONE 5	
36			DUPL 4	
37			ZEND 5	
38				
39			ZONE 6	
40			LIST 4 27	
41			ZEND 6	
42	000061	0000	KW	
43	000071	1000	WD.0	
44	000081	0020	WD.1	
45				
46			ZONE 7	
47			DUPL 6	
48			ZEND 7	
49				
50			ZONE 8	
51			LIST 4 5 26	
52			ZEND 8	
53	000091	0000	KW	
54	0000A1	1800	WD.0	
55	0000B1	0040	WD.1	
56				
57			ZONE 9	
58			LIST 20	
59			ZEND 9	
60	0000C1	4000	KW	

## 0002 .MAIN

01	00000'	0040	WD.1
02			
03			ZONE 10
04			LIST 3
05			ZEND 10
06	0000E'	8000	KW
07	0000F'	2000	WD.0
08			
09			ZONE 11
10			LIST 2 3
11			ZEND 11
12	00010'	8000	KW
13	00011'	6000	WD.0
14			
15			ZONE 12
16			LIST 1 2 3
17			ZEND 12
18	00012'	8000	KW
19	00013'	6000	WD.0
20			
21			ZONE 13
22			ZEND 13
23			
24			ZONE 14
25			ZEND 14
26			
27			ZONE 15
28			ZEND 15
29			
30			ZONE 16
31			ZEND 16
32			
33			ZONE 17
34			ZEND 17
35			
36			ZONE 18
37			ZEND 18
38			
39			ZONE 19
40			ZEND 19
41			
42			ZONE 20
43			ZEND 20
44			
45			ZONE 21
46			ZEND 21
47			
48			ZONE 22
49			ZEND 22
50			
51			ZONE 23
52			ZEND 23
53			
54			ZONE 24
55			ZEND 24
56			
57			ZONE 25
58			ZEND 25
59			
60			ZONE 26

0003 .MAIN

01		ZEND 26
02		
03		ZONE 27
04		ZEND 27
05		
06		ZONE 28
07		ZEND 28
08		
09		ZONE 29
10		ZEND 29
11		
12		ZONE 30
13		ZEND 30
14		
15		ZONE 31
16		ZEND 31
17		
18		
19		
20	00A.P:	;**** OUTER-DIRECTORY ADDRESSES ****
21		
22		
23		
24		ZONE 0
25		ZEND 0
26	00014' FFFF	EMPTY
27		
28		ZONE 1
29		LIST 28 29
30		ZEND 1
31	00015' 0000	DISPL
32		
33		ZONE 2
34		LIST 29 30
35		ZEND 2
36	00016' 0002	DISPL
37		
38		ZONE 3
39		DUPL 2
40		ZEND 3
41	00017' 0002	DISPL
42		
43		ZONE 4
44		LIST 27
45		ZEND 4
46	00018' 0004	DISPL
47		
48		ZONE 5
49		DUPL 4
50		ZEND 5
51	00019' 0004	DISPL
52		
53		ZONE 6
54		LIST 4 27
55		ZEND 6
56	0001A' 0006	DISPL
57		
58		ZONE 7
59		DUPL 6
60		ZEND 7

```

0004 .MAIN
01 0001B' 0006      DISPL
02
03      ZONE 8
04      LIST 4 5 26
05      ZEND 8
06 0001C' 0009      DISPL
07
08      ZONE 9
09      LIST 26
10      ZEND 9
11 0001D' 000C      DISPL
12
13      ZONE 10
14      LIST 3
15      ZEND 10
16 0001E' 000E      DISPL
17
18      ZONE 11
19      LIST 2 3
20      ZEND 11
21 0001F' 0010      DISPL
22
23      ZONE 12
24      LIST 1 2 3
25      ZEND 12
26 00020' 0012      DISPL
27
28      ZONE 13
29      ZEND 13
30 00021' FFFF      EMPTY
31
32      ZONE 14
33      ZEND 14
34 00022' FFFF      EMPTY
35
36      ZONE 15
37      ZEND 15
38 00023' FFFF      EMPTY
39
40      ZONE 16
41      ZEND 16
42 00024' FFFF      EMPTY
43
44      ZONE 17
45      ZEND 17
46 00025' FFFF      EMPTY
47
48      ZONE 18
49      ZEND 18
50 00026' FFFF      EMPTY
51
52      ZONE 19
53      ZEND 19
54 00027' FFFF      EMPTY
55
56      ZONE 20
57      ZEND 20
58 00028' FFFF      EMPTY
59
60      ZONE 21

```

0005 .MAIN		
01		ZONE 21
02	00029' FFFF	EMPTY
03		
04		ZONE 22
05		ZONE 22
06	0002A' FFFF	EMPTY
07		
08		ZONE 23
09		ZONE 23
10	0002B' FFFF	EMPTY
11		
12		ZONE 24
13		ZONE 24
14	0002C' FFFF	EMPTY
15		
16		ZONE 25
17		ZONE 25
18	0002D' FFFF	EMPTY
19		
20		ZONE 26
21		ZONE 26
22	0002E' FFFF	EMPTY
23		
24		ZONE 27
25		ZONE 27
26	0002F' FFFF	EMPTY
27		
28		ZONE 28
29		ZONE 28
30	00030' FFFF	EMPTY
31		
32		ZONE 29
33		ZONE 29
34	00031' FFFF	EMPTY
35		
36		ZONE 30
37		ZONE 30
38	00032' FFFF	EMPTY
39		
40		ZONE 31
41		ZONE 31
42	00033' FFFF	EMPTY
43		
44		
45		.END ZLS.P

## 1 L2 DECIMAL INPUT

Entry (Grp) WD	1	2	3
0	1 0	1 0	3 0
1	1 0 11	1 0 11	2 0 12
2	0 0 0 1	0 0 0 2	0 0 0 3
3	1 1 0 2 3	1 1 0 2 3	2 1 0 2 3
5	6 0 3 5	7 0 8 2	3 0 <sup>126</sup> <del>213</del>
6	2 0 0	2 0 0	2 0 0
4	4	5	6
0	2 0	2 0	2 0
1	1 0 2	1 0 4	4 0 4
2	0 0 0 4	0 0 0 5	0 0 0 6
3	2 1 0 2 3	2 1 0 2 3	3 1 0 2 3
5	2 0 1 1 7	2 0 1 6 6	3 0 7 1
6	1 0 0	1 0 0	2 0 0
7	7	8	9
0	2 0	3 0	3 0
1	1 0 5	2 0 1 2	2 0 1 2
2	0 0 0 7	0 0 0 8	0 0 0 9
3	3 1 0 2 3	4 1 0 2 3	4 1 0 2 3
5	2 0 <del>2</del> 5 0	4 0 2	4 0 1 2
6	1 0 0	1 5 0 0	1 5 0 0

# FL2 HEL OUTPUT

1

1 0 0 0  
2 0 0 B  
0 0 0 1  
1 3 F F  
0 0 0 0  
6 0 2 3  
2 0 0 0  
0 0 0 0  
0 0 0 0  
0 0 0 0  
0 0 0 0

2

1 0 0 0  
2 0 0 B  
0 0 0 2  
1 3 F F  
0 0 0 0  
7 0 5 2  
2 0 0 0  
0 0 0 0  
0 0 0 0  
0 0 0 0  
0 0 0 0

3

3 0 0 0  
4 0 0 C  
0 0 0 3  
2 3 F F  
0 0 0 0  
3 0 7 E  
2 0 0 0  
0 0 0 0  
↓  
0 0 0 0

4

2 0 0 0  
2 0 0 2  
0 0 0 4  
2 3 F F  
0 0 0 0  
2 0 7 5  
1 0 0 0  
0 0 0 0  
↓  
0 0 0 0

5

2 0 0 0  
2 0 0 4  
0 0 0 5  
2 3 F F  
0 0 0 0  
2 6 A 6  
1 0 0 0  
0 0 0 0  
↓  
0 0 0 0

6

2 0 0 6  
8 0 0 4  
0 0 0 6  
3 3 F F  
0 0 0 0  
3 0 4 7  
2 0 0 0  
0 0 0 0  
↓  
0 0 0 0

7

2 0 0 0  
2 0 0 5  
0 0 0 7  
3 3 F F  
0 0 0 0  
2 0 3 2  
1 0 0 0  
0 0 0 0  
↓  
0 0 0 0

8

3 0 0 0  
4 0 0 C  
0 0 0 8  
4 3 F F  
0 0 0 0  
4 0 0 2  
F 0 0 0  
0 0 0 0  
↓  
0 0 0 0

9

0 0 0 0  
4 0 0 C  
0 0 0 9  
4 3 F F  
0 0 0 0  
4 0 0 C  
F 0 0 0  
0 0 0 0  
↓  
0 0 0 0

01			.NRKL	
02			.ENI	EL21
03	000012		.RDX	10
04	0010		.RDXO	16
05				
06		EL21:	EL2	
07			E2WD 0	1 0
08			E2WD 1	1 0 11
09			E2WD 2	0 0 0 1
10			E2WD 3	1 1023
11			E2WD 5	6 0 35
12			E2WD 6	2 0 0
13			E2END	
14	00000'	1000	WD.0	
15	00001'	200B	WD.1	
16	00002'	0001	WD.2	
17	00003'	13FF	WD.3	
18	00005'	6023	WD.5	
19	00006'	2000	WD.6	
20				
21			EL2	
22			E2WD 0	1 0
23			E2WD 1	1 0 11
24			E2WD 2	0 0 0 2
25			E2WD 3	1 1023
26			E2WD 5	7 0 82
27			E2WD 6	2 0 0
28			E2END	
29	00008'	1000	WD.0	
30	0000C'	200B	WD.1	
31	0000D'	0002	WD.2	
32	0000E'	13FF	WD.3	
33	00010'	7052	WD.5	
34	00011'	2000	WD.6	
35				
36			EL2	
37			E2WD 0	3 0
38			E2WD 1	2 0 12
39			E2WD 2	0 0 0 3
40			E2WD 3	2 1023
41			E2WD 5	3 0 126
42			E2WD 6	2 0 0
43			E2END	
44	00016'	3000	WD.0	
45	00017'	400C	WD.1	
46	00018'	0003	WD.2	
47	00019'	23FF	WD.3	
48	0001B'	307E	WD.5	
49	0001C'	2000	WD.6	
50				
51			EL2	
52			E2WD 0	2 0
53			E2WD 1	1 0 2
54			E2WD 2	0 0 0 4
55			E2WD 3	2 1023
56			E2WD 5	2 0 117
57			E2WD 6	1 0 0
58			E2END	
59	00021'	2000	WD.0	
60	00022'	2002	WD.1	



## 0002 .MAIN

01	00023'	0004	WD.2
02	00024'	23FF	WD.3
03	00026'	2075	WD.5
04	00027'	1000	WD.6
05			
06			EL2
07			E2WD 0 2 0
08			E2WD 1 1 0 4
09			E2WD 2 0 0 0 5
10			E2WD 3 2 1023
11			E2WD 5 2 0 166
12			E2WD 6 1 0 0
13			E2END
14	00020'	2000	WD.0
15	00020'	2004	WD.1
16	0002E'	0005	WD.2
17	0002F'	23FF	WD.3
18	00031'	20A6	WD.5
19	00032'	1000	WD.6
20			
21			EL2
22			E2WD 0 2 0
23			E2WD 1 4 0 4
24			E2WD 2 0 0 0 6
25			E2WD 3 3 1023
26			E2WD 5 3 0 71
27			E2WD 6 2 0 0
28			E2END
29	00037'	2000	WD.0
30	00038'	8004	WD.1
31	00039'	0006	WD.2
32	0003A'	33FF	WD.3
33	0003C'	3047	WD.5
34	0003D'	2000	WD.6
35			
36			EL2
37			E2WD 0 2 0
38			E2WD 1 1 0 5
39			E2WD 2 0 0 0 7
40			E2WD 3 3 1023
41			E2WD 5 2 0 50
42			E2WD 6 1 0 0
43			E2END
44	00042'	2000	WD.0
45	00043'	2005	WD.1
46	00044'	0007	WD.2
47	00045'	33FF	WD.3
48	00047'	2032	WD.5
49	00048'	1000	WD.6
50			
51			EL2
52			E2WD 0 3 0
53			E2WD 1 2 0 12
54			E2WD 2 0 0 0 8
55			E2WD 3 4 1023
56			E2WD 5 4 0 2
57			E2WD 6 15 0 0
58			E2END
59	0004D'	3000	WD.0
60	0004E'	4000	WD.1

```

0005 .MAIN
01 0004F' 0008 WD.2
02 00050' 43FF WD.3
03 00052' 4002 WD.5
04 00053' F000 WD.6
05
06 EL2
07 E2WD 0 3 0
08 E2WD 1 2 0 12
09 E2WD 2 0 0 0 9
10 E2WD 3 4 1023
11 E2WD 5 4 0 12
12 E2WD 6 15 0 0
13 E2END
14 00058' 3000 WD.0
15 00059' 400C WD.1
16 0005A' 0009 WD.2
17 0005B' 43FF WD.3
18 0005D' 400C WD.5
19 0005E' F000 WD.6
20
21 .END EL21

```

0004 .MAIN

CLEAR	000007	MC	1/07	1/22	1/37	1/52	2/07	2/22	2/37
			2/52	3/07					
E2END	000105	MC	1/13	1/28	1/43	1/58	2/13	2/28	2/43
			2/58	3/13					
E2WD	00010E	MC	1/07	1/08	1/09	1/10	1/11	1/12	1/13
			1/22	1/23	1/24	1/25	1/26	1/27	1/28
			1/37	1/38	1/39	1/40	1/41	1/42	1/43
			1/52	1/53	1/54	1/55	1/56	1/57	1/58
			2/07	2/08	2/09	2/10	2/11	2/12	2/13
			2/22	2/23	2/24	2/25	2/26	2/27	2/28
			2/37	2/38	2/39	2/40	2/41	2/42	2/43
			2/52	2/53	2/54	2/55	2/56	2/57	2/58
			3/07	3/08	3/09	3/10	3/11	3/12	3/13
			1/06	1/21	1/36	1/51	2/06	2/21	2/36
			2/51	3/06					
			1/02	1/06	3/21				
EL21 ERR	000000 000000	EN	1/08	1/09	1/10	1/11	1/12	1/13	1/23
			1/24	1/25	1/26	1/27	1/28	1/38	1/39
			1/40	1/41	1/42	1/43	1/53	1/54	1/55
			1/56	1/57	1/58	2/08	2/09	2/10	2/11
			2/12	2/13	2/23	2/24	2/25	2/26	2/27
			2/28	2/38	2/39	2/40	2/41	2/42	2/43
			2/53	2/54	2/55	2/56	2/57	2/58	3/08
			3/09	3/10	3/11	3/12	3/13		
			1/08	1/09	1/10	1/11	1/12	1/13	1/23
			1/24	1/25	1/26	1/27	1/28	1/38	1/39
			1/40	1/41	1/42	1/43	1/53	1/54	1/55
			1/56	1/57	1/58	2/08	2/09	2/10	2/11
ERROR	00000E	MC	2/12	2/13	2/23	2/24	2/25	2/26	2/27
			2/28	2/38	2/39	2/40	2/41	2/42	2/43
			2/53	2/54	2/55	2/56	2/57	2/58	3/08
			3/09	3/10	3/11	3/12	3/13		
			1/08	1/09	1/10	1/11	1/12	1/13	1/23
			1/24	1/25	1/26	1/27	1/28	1/38	1/39
			1/40	1/41	1/42	1/43	1/53	1/54	1/55
			1/56	1/57	1/58	2/08	2/09	2/10	2/11
			2/12	2/13	2/23	2/24	2/25	2/26	2/27
			2/28	2/38	2/39	2/40	2/41	2/42	2/43
			2/53	2/54	2/55	2/56	2/57	2/58	3/08
			3/09	3/10	3/11	3/12	3/13		
GENE2	00013E	MC	1/08	1/09	1/10	1/11	1/12	1/13	1/23
			1/24	1/25	1/26	1/27	1/28	1/38	1/39
			1/40	1/41	1/42	1/43	1/53	1/54	1/55
			1/56	1/57	1/58	2/08	2/09	2/10	2/11
			2/12	2/13	2/23	2/24	2/25	2/26	2/27
			2/28	2/38	2/39	2/40	2/41	2/42	2/43
			2/53	2/54	2/55	2/56	2/57	2/58	3/08
			3/09	3/10	3/11	3/12	3/13		
			1/08	1/09	1/10	1/11	1/12	1/13	1/23
			1/24	1/25	1/26	1/27	1/28	1/38	1/39
			1/40	1/41	1/42	1/43	1/53	1/54	1/55
			1/56	1/57	1/58	2/08	2/09	2/10	2/11
QOB	00016A	MC	2/12	2/13	2/23	2/24	2/25	2/26	2/27
			2/28	2/38	2/39	2/40	2/41	2/42	2/43
			2/53	2/54	2/55	2/56	2/57	2/58	3/08
			3/09	3/10	3/11	3/12	3/13		
			1/08	1/09	1/10	1/11	1/12	1/13	1/23
			1/24	1/25	1/26	1/27	1/28	1/38	1/39
			1/40	1/41	1/42	1/43	1/53	1/54	1/55
			1/56	1/57	1/58	2/08	2/09	2/10	2/11
			2/12	2/13	2/23	2/24	2/25	2/26	2/27
			2/28	2/38	2/39	2/40	2/41	2/42	2/43
			2/53	2/54	2/55	2/56	2/57	2/58	3/08
			3/09	3/10	3/11	3/12	3/13		
QQQQ	0000F5	MC	1/08	1/09	1/10	1/11	1/12	1/13	1/23
			1/24	1/25	1/26	1/27	1/28	1/38	1/39
			1/40	1/41	1/42	1/43	1/53	1/54	1/55
			1/56	1/57	1/58	2/08	2/09	2/10	2/11
			2/12	2/13	2/23	2/24	2/25	2/26	2/27
			2/28	2/38	2/39	2/40	2/41	2/42	2/43
			2/53	2/54	2/55	2/56	2/57	2/58	3/08
			3/09	3/10	3/11	3/12	3/13		
			1/08	1/09	1/10	1/11	1/12	1/13	1/23
			1/24	1/25	1/26	1/27	1/28	1/38	1/39
			1/40	1/41	1/42	1/43	1/53	1/54	1/55
			1/56	1/57	1/58	2/08	2/09	2/10	2/11
SHOW	00005A	MC	2/12	2/13	2/23	2/24	2/25	2/26	2/27
			2/28	2/38	2/39	2/40	2/41	2/42	2/43
VERIF	00009D	MC	2/53	2/54	2/55	2/56	2/57	2/58	3/08
			3/09	3/10	3/11	3/12	3/13		
			1/14	1/24	1/44	1/54	2/14	2/24	2/44
			2/59	3/14					
			1/06	1/09	1/10	1/11	1/12	1/13	1/23

		1/24	1/25	1/26	1/27	1/28	1/38	1/39
		1/40	1/41	1/42	1/43	1/53	1/54	1/55
		1/56	1/57	1/58	2/08	2/09	2/10	2/11
		2/12	2/13	2/23	2/24	2/25	2/26	2/27
		2/28	2/38	2/39	2/40	2/41	2/42	2/43
		2/53	2/54	2/55	2/56	2/57	2/58	3/08
		3/09	3/10	3/11	3/12	3/13		
W4A	0000FC MC	1/08	1/09	1/10	1/11	1/12	1/13	1/23
		1/24	1/25	1/26	1/27	1/28	1/38	1/39
		1/40	1/41	1/42	1/43	1/53	1/54	1/55
		1/56	1/57	1/58	2/08	2/09	2/10	2/11
		2/12	2/13	2/23	2/24	2/25	2/26	2/27
		2/28	2/38	2/39	2/40	2/41	2/42	2/43
		2/53	2/54	2/55	2/56	2/57	2/58	3/08
		3/09	3/10	3/11	3/12	3/13		
WD.0	003000	1/07	1/08	1/09	1/10	1/11	1/12	1/13
		1/14	1/22	1/23	1/24	1/25	1/26	1/27
		1/28	1/29	1/37	1/38	1/39	1/40	1/41
		1/42	1/43	1/44	1/52	1/53	1/54	1/55
		1/56	1/57	1/58	1/59	2/07	2/08	2/09
		2/10	2/11	2/12	2/13	2/14	2/22	2/23
		2/24	2/25	2/26	2/27	2/28	2/29	2/37
		2/38	2/39	2/40	2/41	2/42	2/43	2/44
		2/52	2/53	2/54	2/55	2/56	2/57	2/58
		2/59	3/07	3/08	3/09	3/10	3/11	3/12
		3/13	3/14					
WD.1	00400C	1/07	1/08	1/09	1/10	1/11	1/12	1/13
		1/15	1/22	1/23	1/24	1/25	1/26	1/27
		1/28	1/30	1/37	1/38	1/39	1/40	1/41
		1/42	1/43	1/45	1/52	1/53	1/54	1/55
		1/56	1/57	1/58	1/60	2/07	2/08	2/09
		2/10	2/11	2/12	2/13	2/15	2/22	2/23
		2/24	2/25	2/26	2/27	2/28	2/30	2/37
		2/38	2/39	2/40	2/41	2/42	2/43	2/45
		2/52	2/53	2/54	2/55	2/56	2/57	2/58
		2/60	3/07	3/08	3/09	3/10	3/11	3/12
		3/13	3/15					
WD.10	000000	1/07	1/20	1/22	1/35	1/37	1/50	1/52
		2/05	2/07	2/20	2/22	2/35	2/37	2/50
		2/52	3/05	3/07	3/20			
WD.2	000009	1/07	1/08	1/09	1/10	1/11	1/12	1/13
		1/16	1/22	1/23	1/24	1/25	1/26	1/27
		1/28	1/31	1/37	1/38	1/39	1/40	1/41
		1/42	1/43	1/46	1/52	1/53	1/54	1/55
		1/56	1/57	1/58	2/01	2/07	2/08	2/09
		2/10	2/11	2/12	2/13	2/16	2/22	2/23
		2/24	2/25	2/26	2/27	2/28	2/31	2/37
		2/38	2/39	2/40	2/41	2/42	2/43	2/46
		2/52	2/53	2/54	2/55	2/56	2/57	2/58
		3/01	3/07	3/08	3/09	3/10	3/11	3/12
		3/13	3/16					
WD.3	0043FF	1/07	1/08	1/09	1/10	1/11	1/12	1/13
		1/17	1/22	1/23	1/24	1/25	1/26	1/27
		1/28	1/32	1/37	1/38	1/39	1/40	1/41
		1/42	1/43	1/47	1/52	1/53	1/54	1/55
		1/56	1/57	1/58	2/02	2/07	2/08	2/09
		2/10	2/11	2/12	2/13	2/17	2/22	2/23
		2/24	2/25	2/26	2/27	2/28	2/32	2/37

		2/38	2/39	2/40	2/41	2/42	2/43	2/47
		2/52	2/53	2/54	2/55	2/56	2/57	2/58
		3/02	3/07	3/08	3/09	3/10	3/11	3/12
		3/13	3/17					
WD.4	000000	1/07	1/08	1/09	1/10	1/11	1/12	1/13
		1/18	1/22	1/23	1/24	1/25	1/26	1/27
		1/28	1/33	1/37	1/38	1/39	1/40	1/41
		1/42	1/43	1/48	1/52	1/53	1/54	1/55
		1/56	1/57	1/58	2/03	2/07	2/08	2/09
		2/10	2/11	2/12	2/13	2/18	2/22	2/23
		2/24	2/25	2/26	2/27	2/28	2/33	2/37
		2/38	2/39	2/40	2/41	2/42	2/43	2/48
		2/52	2/53	2/54	2/55	2/56	2/57	2/58
		3/03	3/07	3/08	3/09	3/10	3/11	3/12
		3/13	3/18					
WD.5	00400C	1/07	1/12	1/18	1/22	1/27	1/33	1/37
		1/42	1/48	1/52	1/57	2/03	2/07	2/12
		2/18	2/22	2/27	2/33	2/37	2/42	2/48
		2/52	2/57	3/03	3/07	3/12	3/18	
WD.6	00F000	1/07	1/13	1/19	1/22	1/28	1/34	1/37
		1/43	1/49	1/52	1/58	2/04	2/07	2/13
		2/19	2/22	2/28	2/34	2/37	2/43	2/49
		2/52	2/58	3/04	3/07	3/13	3/19	
WD.7	000000	1/07	1/08	1/09	1/10	1/11	1/12	1/13
		1/20	1/22	1/23	1/24	1/25	1/26	1/27
		1/28	1/33	1/37	1/38	1/39	1/40	1/41
		1/42	1/43	1/50	1/52	1/53	1/54	1/55
		1/56	1/57	1/58	2/03	2/07	2/08	2/09
		2/10	2/11	2/12	2/13	2/20	2/22	2/23
		2/24	2/25	2/26	2/27	2/28	2/33	2/37
		2/38	2/39	2/40	2/41	2/42	2/43	2/50
		2/52	2/53	2/54	2/55	2/56	2/57	2/58
		3/03	3/07	3/08	3/09	3/10	3/11	3/12
		3/13	3/20					
WD.8	000000	1/07	1/20	1/22	1/33	1/37	1/50	1/52
		2/03	2/07	2/20	2/22	2/33	2/37	2/50
		2/52	3/03	3/07	3/20			
WD.9	000000	1/07	1/20	1/22	1/33	1/37	1/50	1/52
		2/03	2/07	2/20	2/22	2/33	2/37	2/50
		2/52	3/03	3/07	3/20			
PI	00000C	1/07	1/08	1/09	1/10	1/11	1/12	1/13
		1/14	1/15	1/16	1/17	1/18	1/19	1/20
		1/22	1/23	1/24	1/25	1/26	1/27	1/28
		1/29	1/30	1/31	1/32	1/33	1/34	1/35
		1/37	1/33	1/39	1/40	1/41	1/42	1/43
		1/44	1/45	1/46	1/47	1/48	1/49	1/50
		1/52	1/53	1/54	1/55	1/56	1/57	1/58
		1/59	1/60	2/01	2/02	2/03	2/04	2/05
		2/07	2/08	2/09	2/10	2/11	2/12	2/13
		2/14	2/15	2/16	2/17	2/18	2/19	2/20
		2/22	2/23	2/24	2/25	2/26	2/27	2/28
		2/29	2/30	2/31	2/32	2/33	2/34	2/35
		2/37	2/38	2/39	2/40	2/41	2/42	2/43
		2/44	2/45	2/46	2/47	2/48	2/49	2/50
		2/52	2/53	2/54	2/55	2/56	2/57	2/58
		2/59	2/60	3/01	3/02	3/03	3/04	3/05
		3/07	3/08	3/09	3/10	3/11	3/12	3/13
		3/14	3/15	3/16	3/17	3/18	3/19	3/20

7J 00000C

1/08	1/09	1/10	1/11	1/12	1/13	1/23
1/24	1/25	1/26	1/27	1/28	1/38	1/39
1/40	1/41	1/42	1/43	1/53	1/54	1/55
1/56	1/57	1/58	2/08	2/09	2/10	2/11
2/12	2/13	2/23	2/24	2/25	2/26	2/27
2/28	2/38	2/39	2/40	2/41	2/42	2/43
2/53	2/54	2/55	2/56	2/57	2/58	3/08
3/09	3/10	3/11	3/12	3/13		

Scant type, low ill rate, . . .

GRP	TRUNKS	ODA.GT	1	2	3	4	5	6	7	8	9	10	11	12	13	A, B, C	245.GT
1	27	411	1										1				4000
2	26	211		1													0020
3	1	411										1					4000
4	26	-311	1														8000
5	28, 29, 30	611	1														8000
6	4, 5	811		1													4000
7	29	1011												1	1	1	0010
8	1, 2, 3	1211	1														8000
9	5	1411				1	1										1800
			1														4000
															1		0008
			1														8000
			1	1	1												E000
			1														8000
								1									0800

NGRPS = 9

ODA.ST

φ    x x x  
 1    1  
 2    3  
 3    6  
 4    8  
 5    10  
 6    10  
 .    .  
 .    .  
 .    .  
 15   10

01		.NREL	
02		.END	ZLS.G1
03	000012	.RDX	10
04	0010	.RDXU	16

05

06

07

08

ZLS.G1:

;\*\*\*\* KWC/BV ZONE LISTS \*\*\*\*

09

10

ZONE 1

11

LIST 27

12

ZEND 1

13 00000' 4000

KW

14 00001' 0020

WD.1

15

16

ZONE 2

17

LIST 26

18

ZEND 2

19 00002' 4000

KW

20 00003' 0040

WD.1

21

22

ZONE 3

23

LIST 1

24

ZEND 3

25 00004' 8000

KW

26 00005' 8000

WD.0

27

28

ZONE 4

29

DUPL 2

30

ZEND 4

31

32

ZONE 5

33

LIST 28 29 30

34

ZEND 5

35 00006' 4000

KW

36 00007' 0010

WD.1

37

38

ZONE 6

39

LIST 4 5

40

ZEND 6

41 00008' 8000

KW

42 00009' 1800

WD.0

43

44

ZONE 7

45

LIST 29

46

ZEND 7

47 0000A' 4000

KW

48 0000B' 0008

WD.1

49

50

ZONE 8

51

LIST 1 2 3

52

ZEND 8

53 0000C' 8000

KW

54 0000D' 8000

WD.0

55

56

ZONE 9

57

LIST 5

58

ZEND 9

59 0000E' 8000

KW

60 0000F' 0800

WD.0



```

0002 .MAIN
01
02
03
04
05
06 00010' 0009 ODA.GI: ZCI ;**** OUTER-DIRECTORY ADDRESSES ****
07
08
09 ZONE 1
10 LIST 27
11 ZEND 1
12 00011' 0000 DISPL
13
14 ZONE 2
15 LIST 26
16 ZEND 2
17 00012' 0004 DISPL
18
19 ZONE 3
20 LIST 1
21 ZEND 3
22 00013' 0008 DISPL
23
24 ZONE 4
25 DUPL 2
26 ZEND 4
27 00014' FFFA DISPL
28
29 ZONE 5
30 LIST 28 29 30
31 ZEND 5
32 00015' 000C DISPL
33
34 ZONE 6
35 LIST 4 5
36 ZEND 6
37 00016' 0010 DISPL
38
39 ZONE 7
40 LIST 29
41 ZEND 7
42 00017' 0014 DISPL
43
44 ZONE 8
45 LIST 1 2 3
46 ZEND 8
47 00018' 0018 DISPL
48
49 ZONE 9
50 LIST 5
51 ZEND 9
52 00019' 001C DISPL
53
54
55 .END ZLS.GI

```

## 0005 .MAIN

BASE	000000		1/09	1/15	1/21	1/27	1/30	1/31	1/37
			1/43	1/49	1/55	2/01	2/03	2/12	2/17
			2/22	2/26	2/27	2/32	2/37	2/42	2/47
			2/52						
BIT	000800		1/12	1/18	1/24	1/34	1/40	1/46	1/52
			1/58	2/11	2/16	2/21	2/31	2/36	2/41
			2/46	2/51					
CLEAR	000007	MC	1/09	2/03					
DISPL	00001C		1/15	1/21	1/27	1/30	1/31	1/37	1/43
			1/49	1/55	2/01	2/12	2/17	2/22	2/26
			2/27	2/32	2/37	2/42	2/47	2/52	
DUPL	0001C7	MC	1/29	2/25					
EMPTY	00FFFF		1/09	1/15	1/21	1/27	1/31	1/37	1/43
			1/49	1/55	2/01	2/08	2/12	2/17	2/22
			2/27	2/32	2/37	2/42	2/47	2/52	
FL001	000001		1/11	1/15	1/15	2/10	2/12		
FL002	000001		1/17	1/19	1/21	2/15	2/17		
FL003	000001		1/23	1/25	1/27	2/20	2/22		
FL004	000002		1/29	1/30	1/31	2/25	2/26	2/27	
FL005	000001		1/33	1/35	1/37	2/30	2/32		
FL006	000001		1/39	1/41	1/43	2/35	2/37		
FL007	000001		1/45	1/47	1/49	2/40	2/42		
FL008	000001		1/51	1/53	1/55	2/45	2/47		
FL009	000001		1/57	1/59	2/01	2/50	2/52		
KW	000000		1/09	1/12	1/13	1/14	1/18	1/19	1/20
			1/24	1/25	1/26	1/31	1/34	1/35	1/36
			1/40	1/41	1/42	1/46	1/47	1/48	1/52
			1/53	1/54	1/58	1/59	1/60	2/03	2/11
			2/12	2/16	2/17	2/21	2/22	2/27	2/31
			2/32	2/36	2/37	2/41	2/42	2/46	2/47
			2/51	2/52					
LIST	0001A9	MC	1/11	1/17	1/23	1/33	1/39	1/45	1/51
			1/57	2/10	2/15	2/20	2/30	2/35	2/40
			2/45	2/50					
NOT.0	000104	MC	1/13	1/19	1/25	1/31	1/35	1/41	1/47
			1/53	1/59	2/12	2/17	2/22	2/27	2/32
			2/37	2/42	2/47	2/52			
ODA.6	000010		1/09	2/04	2/06				
SET	00016C	MC	1/12	1/18	1/24	1/34	1/40	1/46	1/52
			1/56	2/11	2/16	2/21	2/31	2/36	2/41
			2/46	2/51					
TRUNK	000004		1/12	1/18	1/24	1/34	1/40	1/46	1/52
			1/58	2/11	2/16	2/21	2/31	2/36	2/41
			2/46	2/51					
TYPE	00016F	MC	1/07	2/02					
WD.0	000000		1/09	1/12	1/14	1/18	1/20	1/24	1/26
			1/27	1/34	1/36	1/40	1/42	1/43	1/46
			1/48	1/52	1/54	1/55	1/58	1/60	2/01
WD.1	000000		1/09	1/12	1/14	1/15	1/18	1/20	1/21
			1/24	1/27	1/34	1/36	1/37	1/40	1/43
			1/46	1/48	1/49	1/52	1/55	1/58	2/01
WD.2	000000		1/09	1/12	1/15	1/18	1/21	1/24	1/27
			1/34	1/37	1/40	1/43	1/46	1/49	1/52
			1/55	1/56	2/01				
WD.3	000000		1/09	1/12	1/15	1/18	1/21	1/24	1/27
			1/34	1/37	1/40	1/43	1/46	1/49	1/52
			1/55	1/58	2/01				
WD.4	000000		1/09	1/12	1/15	1/18	1/21	1/24	1/27
			1/34	1/37	1/40	1/43	1/46	1/49	1/52

			1/55	1/58	2/01			
WD.5	000000		1/09	1/12	1/15	1/18	1/21	1/24
			1/34	1/37	1/40	1/43	1/46	1/49
			1/55	1/58	2/01			
WD.6	000000		1/09	1/12	1/15	1/18	1/21	1/24
			1/34	1/37	1/40	1/43	1/46	1/49
			1/55	1/58	2/01			
WD.7	000000		1/09	1/12	1/15	1/18	1/21	1/24
			1/34	1/37	1/40	1/43	1/46	1/49
			1/55	1/58	2/01			
WD.8	000000		1/09	1/12	1/15	1/18	1/21	1/24
			1/34	1/37	1/40	1/43	1/46	1/49
			1/55	1/58	2/01			
WD.9	000000		1/09	1/12	1/15	1/18	1/21	1/24
			1/34	1/37	1/40	1/43	1/46	1/49
			1/55	1/58	2/01			
WORD	000000		1/12	1/18	1/24	1/34	1/40	1/46
			1/58	2/11	2/16	2/21	2/31	2/36
			2/46	2/51				
ZCI	000009		1/09	1/11	1/13	1/15	1/17	1/19
			1/23	1/25	1/27	1/29	1/30	1/31
			1/35	1/37	1/39	1/41	1/43	1/45
			1/49	1/51	1/53	1/55	1/57	1/59
			2/05	2/06	2/08	2/10	2/12	2/15
			2/20	2/22	2/23	2/26	2/27	2/30
			2/35	2/37	2/40	2/42	2/45	2/47
			2/52					
ZEND	0001E5	MC	1/12	1/18	1/24	1/30	1/34	1/40
			1/52	1/58	2/11	2/16	2/21	2/26
			2/36	2/41	2/46	2/51		
ZLS.G	000000	EN	1/02	1/08	2/03	2/55		
ZN.1	000000		1/11	1/15	2/10	2/12		
ZN.2	000002		1/17	1/21	1/30	2/15	2/17	2/26
ZN.3	000004		1/23	1/27	2/20	2/22		
ZN.4	000006		1/29	1/31	2/23	2/27		
ZN.5	000006		1/33	1/37	2/30	2/32		
ZN.6	000008		1/39	1/43	2/33	2/37		
ZN.7	00000A		1/45	1/49	2/40	2/42		
ZN.8	00000C		1/51	1/55	2/43	2/47		
ZN.9	00000E		1/57	2/01	2/50	2/52		
ZONE	00019C	MC	1/10	1/16	1/22	1/28	1/32	1/38
			1/50	1/56	2/09	2/14	2/19	2/24
			2/34	2/39	2/44	2/49		
?I	000001		1/09	1/12	1/14	1/15	1/18	1/20
			1/24	1/26	1/27	1/34	1/36	1/37
			1/42	1/43	1/46	1/48	1/49	1/52
			1/55	1/58	1/60	2/01	2/11	2/16
			2/31	2/36	2/41	2/46	2/51	
?J	00000B		1/12	1/18	1/24	1/34	1/40	1/46
			1/58					
?K	000004		1/06	1/08	1/09	1/11	1/12	1/13
			1/17	1/18	1/19	1/21	1/23	1/24
			1/27	1/29	1/30	1/31	1/33	1/34
			1/37	1/39	1/40	1/41	1/43	1/45
			1/47	1/49	1/51	1/52	1/53	1/55
			1/58	1/59	2/01	2/02	2/03	2/04
			2/06	2/10	2/11	2/12	2/15	2/16
			2/20	2/21	2/22	2/23	2/26	2/27

0005 .MAIN

2/31	2/32	2/33	2/36	2/37	2/40	2/41
2/42	2/45	2/46	2/47	2/50	2/51	2/52
2/54						

META ASSEMBLER VERSION 2.01

TITLE DUMOR -- DUMMY DRIVER FOR LIBRARY GENERATION TEST

LUC X'1000' PHLDR CAN NOT GENERATE SAVE  
FILES BELOW 420 OCTAL

JSB,A P,IND ?  
PARITY ?

PURGE  
EOF PARITY

```

11  TITLE: PARITY -- PARITY OR BIT COUNT GENERATOR
12
13  ENTRY : PARITY
14
15  INPUTS : ONE ARGUMENT IN A-REG = WORD AMUSE UNES-BITS ARE TO BE LOADED
16
17  ACTIONS: THIS ALGORITHM IS BASED ON THE FACT THAT FOR ANY NON-ZERO BINARY
18            NUMBER 0 REPRESENTED IN A FINITE-LENGTH REGISTAR, THE TRANSFORM
19            1 = G-AND.(U-1) HAS ONE FEWER UNES-BITS THAN U
20
21            1 - U = 0 ? YES: RETURN//NO : STEP 2
22            2 - CNT <-- 0
23            3 - U <-- G-AND.(U-1)
24            4 - CNT <-- CNT+1
25            5 - U = 0 ? YES: RETURN//NO : STEP 3
26
27  OUTPUTS: BIT COUNT (CNT) RETURNED IN A-REG, OTHER REG'S UNCHANGED
28
29  GLOBAL : NONE
30
31  REF'S :
32
33  SIZING : MODULE LENGTHS SHOWN BY NEXT THREE EQUATES
34
35  CODE= LASC0-3
36  DATA= LASUA-LASCU
37  TOTAL= CODE+DATA
38
39  STACK : MAXIMUM STACK DEPTH INCL RETURN ADDRESS = 3
40
41  AUTHOR : S.J.WERSAN      RAYTHEON CO., ESU      DEPT. 9283
42
43  DATE : 1976 SEPT 10      SANTA BARBARA, CA
44
45  EJECT

```

ENTRY POINT

45  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66  
67  
68  
69  
70

```

1002 9E0C #PARITY: JNZ DUNE      ; IF 0 = 0, EXIT
1003 00C2 PSH B      ; SAVE B-REG
1004 00C5 PSH E      ; E-REG
1005 6012 CLR B      ; COUNT <-- 0
1006 1025 PLOOP: MOV A,E      ; U <-- U-AND.(U-1)
1007 0020 DSZ,E      ;
1008 0000 NOP      ;
1009 5020 AND,A      ;
100A 0012 ISZ,B      ; COUNT <-- COUNT+1
100B 00FA JNZ PLOOP      ; IF U = 0, EXIT ELSE GO TO PLOOP
100C 1014 MOV B,A      ; COUNT TO A-REG
100D 1005 POP E      ; RESTORE E-REG
100E 1002 POP B      ; B-REG
100F 0044 DUNE: EXIT      ; RETURN
1010 LASOE $
1010 LASDAE $
PURGE
EOP ELL

```

TITLE: ELI -- EMITIER LIBRARY 1

ENTRIES: UOV.F, UOA.F, ZLS.F,  
UOV.PI, UOA.PI, ZLS.PI  
UOA.PW, ZLS.PW

INPUTS : NONE. THIS IS A SET OF STATIC TABLES THAT EXISTS FROM THE  
BEGINNING OF THE PROGRAM AND IS NOT ALTERED DYNAMICALLY.

ACTIONS: CONTAINS NO EXECUTABLE CODE.  
STORAGE DEFINITION ONLY.

OUTPUTS: NONE

GLOBAL : NONE

REFR'S :

SIZING : MODULE LENGTHS SHOWN BY NEXT THREE EQUATES

CODE= LASCU-S  
DATA= LASDA-LASCU  
TOTAL= CODE+DATA

STACK : MAXIMUM STACK DEPTH INCL RETURN ADDRESS = 0

AUTHOR : S.J.WERSAN RAYTHEON CO., ESO DEPT. 9285

DATE : 1976 DEC 27 SANTA BARBARA, CA

HISTORY: REPLACES ADM LIBRARY VERSION OF OCT 1

1010 LASCU= S

EJECT





TITLE LIBLINK -- TABLES THAT LINK ELI TO EL2

ENTRIES: UDA.GI & ZLS.GI

INPUTS : NONE. THIS IS A SET OF STATIC TABLES THAT EXISTS FROM THE BEGINNING OF THE PROGRAM AND IS NOT ALTERED DYNAMICALLY.

ACTIONS: CONTAINS NO EXECUTABLE CODE.  
STORAGE DEFINITION ONLY.

OUTPUTS: NONE

GLOBAL : NONE

REFR'S :

SIZING : MODULE LENGTHS SHOWN BY NEXT THREE EQUATES

CODE= LASCU=S  
DATA= LASDA=LASCU  
TOTAL= CODE+DATA

STACK : MAXIMUM STACK DEPTH INCL RETURN ADDRESS = 0

AUTHOR : S.J.WEISMAN - RAYTHEON CO., ESD - DEPT. 9285

DATE : 1976 DEC 27 SANTA BARBARA, CA

1004 LASCU= S

\*\*\*\*\*

KWC / BV TRUNK LISTS FOR EACH GROUP

ZLS.GI: RES 16 LENGTH IS FOR TRAIL LIBRARY 1

GROUP / TRUNK OUTER DIRECTORY

0009 NGRPE 9 NUMBER OF GROUPS

10E4 0009 UDA.GI: RES NGRP ?1-ST WORD CONTAINS LENGTH OF LIST TO FOLLOW  
10E5 NGRP NGRP ?RESERVE THE SPACE

10EE LASDA= S

EOF ANEC2

178

```

ANEC2 -- EMITTER CLASSIFICATION PROC.#2 - ANALYSIS WITH SUBM 12/20/76 14:50: 4 PAGE /
179 TITLE ANEC2 -- EMITTER CLASSIFICATION PROC.#2 - ANALYSIS WITH SUBROUTINE
180
181 ENTRY : ANEC2
182
183 INPUTS : X-REG --> 1-ST WORD OF 3-WORD BLOCK
184
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PEUCBAY076545210 <-- BII #  
 WORD 1: <--ANEC--> ANEC = AN-RET MODULE CODE  
 WORD 2: <--CLAD--> CLAD = EMITTER TRACK FILE #  
 WORD 3: <--SPU--> SPU = CANU-LIST ADDR  
 ST = SCAN TYPE FROM LAST ANALYSIS  
 SPU = " PERIOD "

ACTION : CALL ANST2 TO PERFORM SCAN TEST 2.  
 PERFORM LEVEL 2 SEARCH (ANLV2): IF NO CANDIDATES ARE LEFT ON  
 CANDU-LIST EXIT IMMEDIATELY TO CALL+2 W/O MESSAGE SENT,  
 ELSE PERFORM A NEW EMITTER LINK ANALYSIS #1 (ANEL1).  
 IF CONTEMPORANEOUS ANALYSIS IS (IS NOT) REQUIRED, ANEL1  
 RETURNS TO CALL+2 (CALL+1) SETTING (RESETTING) THE ANALYSIS-  
 WANTED BIT OF THE CONTEMPORANEOUS ANALYSIS REQUEST MESSAGE (CRUMSG).

OUTPUTS: EIP VARIABLES ALTERED BY CITED SUBROUTINES.  
 IF NO CANDIDATES LEFT RETURN TO CALL+2, ELSE  
 RETURN TO CALL+1 WITH X-REG --> CRUMSG

GLOBAL : 1. TABLES -- ONLY WITHIN DEPENDENT SUBROUTINES  
 REF'S : 2. SUBROUTINES -- ANST2 ?SCAN TEST 2  
 ANLV2 ?LEVEL 2 SEARCH  
 ANEL1 ?NEW EMITTER LINK ANALYSIS #1

3. PARAMETERS --  
 ERMCAQ= 1 ?EXEC MSG # FOR CONTEMP-ANA-NEW  
 RMCECS= 9 ?RETURN MODULE CODE FOR ECS

SIZING : MODULE LENGTHS SHOWN BY NEXT THREE EQUATES  
 CODE= LASCU-S  
 DATA= LASDA-LASCU  
 TOTAL= CODE+DATA

STACK : MAXIMUM STACK DEPTH INCL RETURN ADDRESS = 3  
 AUTHOR : S.J.WERSAN KAYTHEON CO., ESO DEPI-9285  
 DATE : 1976 OCT 2 SANTA BARBARA, CA  
 EJECT

```
228      ? ENTRY POINT
229      ?
230 00010000 DB11 ANEC2: JSB      ANS12  ?PERFORM SCAN TEST 2
231      ?
232 10F0 00C4      PSH      A      ?SAVE A-REG
233 10F0 00C2      PSH      B      ?      B-REG
234 10F1 1001      LUS      1,X    ?GET CANDIDATE LIST ADDR
235 10F2 0010      SIS      CMCLAD ?STORE IN ANALYSIS REQUEST MESSAGE
236 10F3 1023      MOV      A,X    ?PUT IN X-REG FOR CALL ANLV2 HELD
237      ?
238 000100F4 0000      JSB      ANLV2 ?PERFORM LEVEL 2 SEARCH
239 10F5 0011      JMP      DUNE     ?NO CANDIDATES LEFT --> LEAVE
240      ?
241 10F6 1400      LUS      0,X    ?FINISH FORMATTING MESSAGE
242 10F7 500C      AND,A      P,INC  ?
243 10F8 00FF      X'FF'      ?
244 10F9 000C      IOR,A      P,INC  ?
245 10FA 0400      SIS      CMCEC518 ?
246 10FB 0011      SIS      CRRMCU   ? (RETURN.MODULE.CODE,EPW) BYTE-SPLIT WORK
247      ?
248 10FC 100C      LUS,A      P,INC  ?PREQUEST WORD IN A-REG PENDING CALL ANEL1
249 10FD 0000      LUS,B      P,INC  ?AN-BIT ANIHILATOR IN B-REG
250 10FE 100A      JSB,A      P,INC  ?PERFORM NEW EMITTER LINK ANALYSIS #1
251 10FF 0000      ANEL1
252 1100 004C      XOR,A      B      ?NO CONTEMP ANALYSIS NEEDED: CLOOBER AN-BIT
253 1101 0000      ?
254      ?
255 1102 0014      SIS      CRRMCU   ?STORE FINISHED REQUEST WORD
256 1103 0000      LUS,X      P,INC  ?PUT MESSAGE ADDRESS IN X-REG
257 1104 1000      CRRMC5G
258 1105 1100      JMP      $+2     ?JUMP OVER BUMP: RETURN TO CALL+1
259 1106 0001      ISZ      2,S     ?BUMP RETURN ADDRESS TO CALL+2
260      ?
261 1107 0702      POP      B      ?RESTORE B-REG
262 1108 1002      POP      A      ?      A-REG
263 1109 1004      EXIT
264 110A 0044      ?
265 110B LASOE= $
266      ?
267      ?
268      ?
269      ?
270      ?
271      ?
272 110B 0001 CRRMC5G: EMNCAU      ?EXECUTIVE MESSAGE #
273 110C 0003      ?# OF WORDS TO FOLLOW
274 110D 0000 CRRMCU: 0          ?FILLED BY ANEC2: (RETURN.MODULE.CODE, EPW)
275 110E 0000 CMCLAD: 0          ?      "      " : CAND.LIST ADDR
276 110F 0000 CRRMCW: 0          ?      "      " : ANALYSIS-REQUEST WORD
277      ?
278      ?
279 1110 LASUAE= $
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5 ERRORS ---- TERMINATED 12/28/76 AT 14:40:21  
SYMBOL SPACE USED: A MAXIMUM OF 121 OUT OF 500  
A TOTAL OF 22 SYMBOLS WAS PURGED

CROSS-REFERENCE TABLE FOR LOCAL SYMBOLS -- BEGINNING WITH LINE # 10

SYMBOL	VALUE	TYPE	LINE	NUMBERS	LINE	NUMBERS	LINE	NUMBERS
CODE	0000	=	55	57				
DATA	0000	=	56	57				
DONE	1000	:	48	64				
LASCO	1010	=	35	56	66			
LASDA	1010	=	56	67				
PLUOP	1006	:	55	59				
TOTAL	0000	=	57					

CROSS-REFERENCE TABLE FOR LOCAL SYMBOLS -- BEGINNING WITH LINE # 70

SYMBOL	VALUE	TYPE	LINE	NUMBERS	LINE	NUMBERS
CODE	FFEB	=	90	92 151 153 217 219		
CRCLAD	110E	:	255	275		
CRUNSB	110H	:	259	272		
CRRENW	110P	:	257	276		
CRRNCO	110U	:	246	274		
DATA	001A	=	91	92 152 153 218 219		
DONE	1107	:	259	262		
EMNCAU	0001	=	212	272		
LASCU	110H	=	90	91 102 151 152 161 217 218 268		
LASDA	1110	=	91	151 152 176 218 279		
NFRU	0015	=	107	110 112 113		
NGRP	0009	=	171	175 174		
NPRI	0015	=	117	120 122 123		
RMCECS	0009	=	213	245		
TOTAL	0000	=	92	153 219		

CROSS-REFERENCE TABLE FOR GLOBAL SYMBOLS

SYMBOL	VALUE	TYPE	LINE	NUMBERS	LINE	NUMBERS
ANEC2	1022	:	230			
ODA.F	1022	:	110			
ODA.GT	1024	:	173			
ODA.PI	1079	:	120			
ODA.PW	1004	:	129			
ODV.F	1041	:	112			
ODV.PI	1082	:	122			
PARITY	1002	:	7	48		
ZLS.F	1010	:	109			
ZLS.GT	1004	:	167			
ZLS.PI	1055	:	119			
ZLS.PW	1040	:	127			

```

PRINT LIBF1.J8
RLDR/L 10020/N LIBF1 X/L:MAP/D X
MKABS/Z 10020/P 10120/T LIBF1.SV LIBF1.AB
BL00K/M LIBF1.AB

```

LIBF1.SV      LOADED BY RLDR REV 05.01 AT 15:47:48 12/28/76

MAIN TMIN

```

NMAX 010222      ZMAX 000050      CSZE 000000      EST 000000      SSI 000000
USTAD 000400      ZLS.F 010020      TMIN 010126

```

```

LIBF1.AB
ADDR CS3M DATA      15:48:11      12/28/76      PAGE 1
FFFD 1010 F700 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
FFFD 1020 2EFD 4000 0040 4000 0060 4000 0020 4000 0010 4000 0018 4000 0000 0000 0000 0000
FFFD 1030 2F1E 0002 0004 0006 0008 000A 000C 000E 0010 0012 0014 0016 0018 001A 001C 001E
FFFD 1040 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000 1000
FFFD 1050 F60F 2F52 2F55 3020 30C0 3200 3300 3400 3500 3600 3700 3800 3900 3A00 3B00 3C00

```



PRINT LIBP11.JOB  
 HLDR/2 10125/N LIBP11 X/L/MAP/0 X  
 MKANS/2 10125/P 10237/L LIBP11.SV LIBP11.AB  
 PLUOK/H LIBP11.AB

LIBP11.SV LOADED BY HLDR REV 03.01 AT 16:03:03 12/28/70

.MAIN IMIN

INMAX 010335 ZMAX 000050 CSZE 0000000 EST 0000000 SST 0000000  
 USIAD 000400 ZLS.P 010125 IMIN 010241

LIBP11.AB	DATA	16: 3:26	12/28/70	PAGE	1
FFFF 1055 9447 4000 0000 0000 0000 0000	4000 0000 0000 0000	1000 0000 0000 0000	1000 0000 0000 0000	1000 0000 0000 0000	1000 0000 0000 0000
FFFF 1065 8648 0029 0000 0020 0000 0000	2000 0000 0000 0000	0000 0000 0000 0000	0000 0000 0000 0000	0000 0000 0000 0000	0000 0000 0000 0000
FFFF 1075 2705 8000 0800 0010 0000 0000	4000 0000 0000 0000	0000 0000 0000 0000	0000 0000 0000 0000	0000 0000 0000 0000	0000 0000 0000 0000
FFFF 1085 0040 0014 0011 0010 0020 0000	0010 0010 0010 0010	0000 0000 0000 0000	0000 0000 0000 0000	0000 0000 0000 0000	0000 0000 0000 0000
FFFF 1095 8C07 0344 037F 0328 0410 0438	0344 037F 0328 0410	044F 0468 0440 040C	040C 0440 040C 0440	040C 0440 040C 0440	040C 0440 040C 0440

256  
 27  
 1792  
 1000

PRINT LIBPI.JB  
 RLOC/2 10240/N LIBPI X/L/MAF/D X  
 RLABS/2 10240/P 103230/L LIBPI.SV LIBPI.AB  
 BLOC/K/M LIBPI.AB

LIBPI.SV LOADED BY RLOC REV 03.01 AT 15:49:24 12/26/76

-MAIN TMIN

NMAX 010421 ZMAX 000050 CSZE 000000 ESI 000000 SSI 000000  
 USTAD 000400 ZLS.P 010240 TMIN 010525

LIBPI.AB	DATA →	15:49:55	12/26/76	PAGE	1
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0048	0048	0048	0048	0048	0048
0049	0049	0049	0049	0049	0049
0050	0050	0050	0050	0050	0050
0051	0051	0051	0051	0051	0051
0052	0052	0052	0052	0052	0052
0053	0053	0053	0053	0053	0053
0054	0054	0054	0054	0054	0054
0055	0055	0055	0055	0055	0055
0056	0056	0056	0056	0056	0056
0057	0057	0057	0057	0057	0057
0058	0058	0058	0058	0058	0058
0059	0059	0059	0059	0059	0059
0060	0060	0060	0060	0060	0060
0061	0061	0061	0061	0061	0061
0062	0062	0062	0062	0062	0062
0063	0063	0063	0063	0063	0063
0064	0064	0064	0064	0064	0064
0065	0065	0065	0065	0065	0065
0066	0066	0066	0066	0066	0066
0067	0067	0067	0067	0067	0067
0068	0068	0068	0068	0068	0068
0069	0069	0069	0069	0069	0069
0070	0070	0070	0070	0070	0070
0071	0071	0071	0071	0071	0071
0072	0072	0072	0072	0072	0072
0073	0073	0073	0073	0073	0073
0074	0074	0074	0074	0074	0074
0075	0075	0075	0075	0075	0075
0076	0076	0076	0076	0076	0076
0077	0077	0077	0077	0077	0077
0078	0078	0078	0078	0078	0078
0079	0079	0079	0079	0079	0079
0080	0080	0080	0080	0080	0080
0081	0081	0081	0081	0081	0081
0082	0082	0082	0082	0082	0082
0083	0083	0083	0083	0083	0083
0084	0084	0084	0084	0084	0084
0085	0085	0085	0085	0085	0085
0086	0086	0086	0086	0086	0086
0087	0087	0087	0087	0087	0087
0088	0088	0088	0088	0088	0088
0089	0089	0089	0089	0089	0089
0090	0090	0090	0090	0090	0090
0091	0091	0091	0091	0091	0091
0092	0092	0092	0092	0092	0092
0093	0093	0093	0093	0093	0093
0094	0094	0094	0094	0094	0094
0095	0095	0095	0095	0095	0095
0096	0096	0096	0096	0096	0096
0097	0097	0097	0097	0097	0097
0098	0098	0098	0098	0098	0098
0099	0099	0099	0099	0099	0099
0100	0100	0100	0100	0100	0100

```

PRINT EL21.JOB
RLOK/Z 10420/H EL21 X/L:MAP/U X
MKANS/Z 10420/H 10502/H EL21.SV EL21.AB
RLOK/H EL21.AB

```

EL21.SV LOADED BY RLOK REV 05.01 AT 15:52:54 12/28/76

MAIN IMIN

```

NMAX 010650 ZMAX 000050 CSZE 000000 EST 000000 SSI 000000
USFAD 000400 EL21 010420 IMIN 010504

```

```

EL21.AB      15:55:17      12/28/76      PAGE      1
DATA ->
ADDR  CSZM
FFFF 1110 86C0 1000 2008 0001 13FF 0000 6025 2000 0000 0000 0000 0000 2008 0002 13FF 0000
FFFF 1120 7A12 7052 2000 0000 0000 0000 0000 0000 400C 0005 23FF 0000 507E 2000 0000 0000
FFFF 1150 F65E 0000 2000 2002 0004 23FF 0000 2075 1000 0000 0000 0000 0000 2004 0005 23FF
FFFF 1140 4904 0000 20A0 1000 0000 0000 0000 0000 2005 0000 0004 0000 55FF 0000 5047 2000 0000
FFFF 1150 0A0F 0000 0000 2000 2005 0007 55FF 0000 2032 1000 0000 0000 0000 0000 400C 0000
FFFF 1160 968F 43FF 0000 4002 F000 0000 0000 0000 0000 0000 400C 0004 43FF 0000 400C 0000
FFFF 1170 EE95 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000

```

1172



## MACRO'S AND INSTRUCTIONS:

The MACRO's and instructions for their usage are attached. These MACRO's apply to the generation of emitter track files, EL2 data files, EL1 tables, or library linkage tables.

EXAMPLE: USER WISHES TO GENERATE TEST DATA AND IS CONCERNED ONLY WITH WORDS 0 AND 7; HE CODES AS FOLLOWS:

USER'S CODE	COMMENTARY
.RDX 10	SETS INPUT RADIX TO DECIMAL
EIF	INITIALIZATION
EFWD 0 0 1 3125	WORD 0: ETH = 0, ELP = 1, EAPI = 3125
EFWD 7 15 938	WORD 7: ESTY = 15, ESPD = 938
EFEND	OUTPUTS ALL 16 EIF WORDS, DISPLAYING ONLY THOSE NOT = 0

NOTES : EACH FILE GENERATED MUST START WITH AN 'EIF' AND END WITH AN 'EFEND'. THE ORDER OF THE 'EFWD'S IN BETWEEN IS IMMATERIAL.

THE I-TH WORD (I = 0,1, ... ,15) IS GENERATED BY WRITING

EFWD I F1 F2 ... FN

WHERE THE F'S ARE THE FIELDS REQUIRED FOR THE I-TH WORD UNDER THE FOLLOWING RULES:

- I MUST BE A DECIMAL INTEGER 0-15 WITHOUT DECIMAL POINT NO MATTER WHAT INPUT RADIX IS FOR #'S AMONGST THE F'S. I MUST BE SEPARATED FROM 'WORD' BY A SINGLE SPACE, TAB OR COMMA.
- THE F'S MAY BE EXPRESSIONS AND MUST BE SEPARATED BY SPACE(S), TAB(S) OR COMMA(S).
- THE FIELDS ARE PRESENTED IN LEFT-TO-RIGHT ORDER, AND EACH FIELD FOR A GIVEN WORD MUST BE GIVEN EXPLICITLY.
- EXTRA FIELDS ARE IGNORED AND A FIELD VALUE TOO LARGE FOR THE ALLOTTED NUMBER OF BITS IS TRUNCATED WITHOUT DIAGNOSTIC.

AS IMPLIED BY THE EXAMPLE, THE RADIX FOR INTERPRETING NUMERIC LITERALS IS UNDER THE USER'S CONTROL. THE OUTPUT RADIX IS ALWAYS HEXADECIMAL.

ERRORS : 1. ";\*\*\*\*\* ERROR: WORD # NOT IN RANGE 0-15 \*\*\*\*\*"  
";\*\*\*\*\* ERROR: EFWD MACRO WITHOUT ARGUMENTS \*\*\*\*\*"

HAS NO EFFECT ON CURRENT FILE.

2. ";\*\*\*\*\* ERROR: TOO FEW ARGUMENTS FOR WORD '1' \*\*\*\*\*"  
'1' IS REPLACED BY ACTUAL 1-ST ARGUMENT TO WORD MACRO.  
THE I-TH WORD WILL HAVE THE VALUE 0.

3. USER SHOULD AVOID USING FOLLOWING SET OF NAMES. TO DO SO CAN CAUSE ERRORS WHICH THE MACRO ASSEMBLER MAY OR MAY NOT FLAG.

CLEAR	ERROR	SHOW	EFDAI	ERR	?I	?J
WD.0	... WD.15	VERIF	GENR6			

```
.MACRO EIF
** .NUMAC 1
CLEAR 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
%
```

```
.MACRO CLEAR
** .NUMAC 1
?1=1
.DU .ARGC1
WD.1?1=0
?1=?1+1
.ENDC
%
```

```
.MACRO ERROR
** .NUMAC 0
** .PUSH .NUCON
** .NUCON 1
** .IFE T1-1
;***** ERROR: WORD # NOT IN RANGE T2 *****
** .ENDC
** .IFE T1-2
;***** ERROR: TOO FEW ARGUMENTS FOR WORD T2 *****
** .ENDC
** .IFE T1-3
;***** ERROR: T2 MACRO WITHOUT ARGUMENTS *****
** .ENDC
** .NUMAC 1
ERR=1
.NUCON .POP
%
```

```
.MACRO EFEND
** .NUMAC 1
.PUSH .RDXU
.RDXU 16
SHOW 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
.RDXU .POP
%
```

```
.MACRO SHOW
** .NUMAC 0
** .PUSH .NUCON
** .NUCON 1
** ?I=1
** .DU .ARGC1
** .IFE WD.1?1
** 0
** .ENDC
** .IFN WD.1?1
WD.1?1
** .ENDC
** ?I=?I+1
** .ENDC
** .NUMAC 1
.NUCON .POP
%
```

```
.MACRO EFWD
** .NOMAC 1
ERR=0
```

```
.IFE .ARGC1
ERROR 3 EFWD
.ENDC
```

```
.IFE ERR
  .IFN T1>15.
    ERROR 1 0-15
  .ENDC
.ENDC
```

```
.IFE ERR
.PUSH .ARGC1
VERIFY THAT .ARGC1 >= 2 WHEN T1 = 4
  .IFE ERR
VERIFY THAT .ARGC1 >= 3 WHEN T1 = 1,,8,,9,,11,,12,,13,,14.
  .IFE ERR
VERIFY THAT .ARGC1 >= 4 WHEN T1 = 0,6
  .IFE ERR
VERIFY THAT .ARGC1 >= 5 WHEN T1 = 2,5
  .IFE ERR
VERIFY THAT .ARGC1 >= 6 WHEN T1 = 5
  .IFE ERR
VERIFY THAT .ARGC1 >= 8. WHEN T1 = 15.
  .IFE ERR
VERIFY THAT .ARGC1 >= 10. WHEN T1 = 10.
  .ENDC
.ENDC
.ENDC
.ENDC
.ENDC
.ENDC
ENDC
?I=.POP
.ENDC
```

```
.IFE ERR
  .IFE T1-10.
    ?I=10
    WD.10=((T9&15.JB(11.))!(T?1&15.))
  .ENDC
GENEF T1 T2 T3 T4 T5 T6 T7 T8
.ENDC
%
```

```
.MACRO VERIFY
** .NOMAC 1
?I=.ARGC1-1
?J=8
.DO ?I*(1-ERR)
  .IFE T6-T?J
    .IFE .TOPTST4
    ERROR 2 T6
  .ENDC
.ENDC
?J=?J+1
.ENDC
%
```



```
.MACRO GENEF
** .NUMAC 1
```

```
.IFE T1*(T1-6)
WD.T1=((T2&1)B(0))!((T3&1)B(1))!((T4&16585.))
.ENDC
```

```
.IFE (T1-1)*(T1-8.)*(T1-9.)*(T1-11.)*(T1-12.)*(T1-13.)*(T1-14.)
WD.T1=((T2&255.)B(7))!((T3&255.))
.ENDC
```

```
.IFE (T1-2)*(T1-3)
WD.T1=QQQQ(T2,T3,T4,T5)
.ENDC
```

```
.IFE T1-4
WD.4=T2&65555.
.ENDC
```

```
.IFE T1-5
WD.5=((T2&15.)B(3))!((T3&15.)B(7))!((T4&31.)B(12.))!((T5&1)B(14.))!((T6&1)
.ENDC
```

```
.IFE T1-7
WD.7=W4A(T2,T3)
.ENDC
```

```
.IFE T1-10.
?I=2
?J=0
```

```
    .DO /
    WD.10=WD.10!((T?I&1)B(?J))
    ?I=?I+1
    ?J=?J+1
    .ENDC
```

```
.ENDC
```

```
.IFE T1-15.
WD.15=((T2&1)B(0))!((T3&1)B(1))!((T4&1)B(2))!((T5&1)B(3))!((T7&1)B(11.))
WD.15=WD.15!((T6&15.)B(7))!((T8&15.))
.ENDC
```

```
%
```

```
.MACRO QQQQ
((T1&15.)B(3))!((T2&15.)B(7))!((T3&15.)B(11.))!((T4&15.))%
```

```
.MACRO W4A
((T1&15.)B(3))!((T2&1023.))%
```

```

;  MACROS FOR GENERATING EMITTER LIBRARY 2 DATA
;
;  ALL CONVENTIONS ARE THE SAME AS FOR THE EIF-GENERATION MACROS
;
;  EXCEPT THE NAMES:
;
;          EL2
;          E2WD 8 13 14 15 9
;          E2WD 9 0 2 3 12
;          E2END
;
;          . . . ETC.
;
.MACRO EL2
**.NUMAC 1
CLEAR 0 1 2 3 4 5 6 7 8 9 10
%

.MACRO E2END
**.NUMAC 1
.PUSH .RDXU
.RDXU 16
SHOW 0 1 2 3 4 5 6 7 8 9 10
.RDXU .POP
%

.MACRO E2WD
**.NUMAC 1
ERR=0

.IFE .ARGCT
ERROR 3 E2WD
.ENDC

.IFE ERR
.IFN T1>10.
ERROR 1 0-10
.ENDC
.ENDC

.IFE ERR
.PUSH .ARGCT
VERIFY THAT .ARGCT >= 2 WHEN T1 = 4
.IFE ERR
VERIFY THAT .ARGCT >= 3 WHEN T1 = 0,3,7
.IFE ERR
VERIFY THAT .ARGCT >= 4 WHEN T1 = 1,5,6
.IFE ERR
VERIFY THAT .ARGCT >= 5 WHEN T1 = 2,8,9,10
.ENDC
.ENDC
.ENDC
?1=.POP
.ENDC

.IFE ERR
GENE2 T1 T2 T3 T4 T5
.ENDC
%

```

.MACRO GENE2

\*\* .NUMAC 1

.IFE T1

WD.0=((T2&15.)B(3))!((T3&4095.)

.ENDC

.IFE T1-1

WD.1=((T2&7.)B(2))!((T3&31.)B(7))!((T4&255.)

.ENDC

.IFE T1-2

WD.2=((T2&1.)B(0))!((T3&1.)B(1))!((T4&15.)B(7))!((T5&255.)

.ENDC

.IFE T1-3

WD.3=W4A(T2,T3)

.ENDC

.IFE T1-4

WD.4=W4A(0,T2)

.ENDC

.IFE (T1-5)\*(T1-6)

WD.11=QWB(T2,T3,T4)

.ENDC

.IFE T1-7

WD.7=QWB(0,T2,T3)

.ENDC

.IFG T1-7

WD.11=QWB(T2,T3,T4,T5)

.ENDC

%

.MACRO QWB

((T1&15.)B(3))!((T2&15.)B(7))!((T3&255.)%

# MACROS FOR GENERATING EMITTER LIBRARY 1 DATA

RULES: EACH OF THE FOUR TYPES OF EL1 PARTS (F,PI,PW,GT) MAY BE GENERATED IN A .DD-LOOP AS FOLLOWS:

USER'S CODE	C O M M E N T A R Y
?K=1	INDEX USED INSIDE MACROS
.DD N	N = 3 FOR F & PI; = 2 FOR PW & GT
TYPE XX	XX = LITERALLY F, PI, PW OR GT
<RECORD>	SYNTACTIC EXPANSION BELOW
<RECORD>	.
...	.
<RECORD>	.
?K=?K+1    (?K=4)	ADVANCE INDEX (FOR TYPE GT ONLY)
.ENDC	END OF .DD-LOOP

RECORD: EACH RECORD PERTAINS TO A RANGE OF THE PARAMETER NOMINATED IN THE 'TYPE' MACRO. LET THE FOLLOWING BE SEVERAL SUCH RANGES.

NO.	LOW	TO	HIGH	T R U N K	L I S T
18	342	10	619	15 16 17	21 31 35 43 44 45
19	620	10	734		
20	735	10	751	13 14 15 16 17	21 31 35 43 44 45
21	752	10	799	15 16 17	21 31 35 43 44 45

THE CORRESPONDING RECORDS ARE ENCODED:

```

ZONE 18 342
LIST 15 16 17 21 31 35 43 44 45
ZEND 18

ZONE 19 620
ZEND 19                (NO LIST ==> EMPTY)

ZONE 20 735
LIST 13 14 15 16 17 21 31 35 43 44 45
ZEND 20

ZONE 21 752
DUPL 18                (LIST IS DUPLICATE OF ZONE 18'S)
ZEND 21
  
```

NOTES: A LONG LIST MAY BE BROKEN UP INTO SEVERAL LINES EACH STARTING WITH CALL ON MACRO 'LIST'.

RESULTS: ON 1-ST PASS THRU LOOP, GENERATES ZLS.XX (ALL XX)  
 2-ND                    ODA.XX (XX = NE, GT)  
 3-RD                    ODV.XX (XX = F OR PI)  
 4-TH                    ODA.GT

THE SECOND ARGUMENT OF 'ZONE' MAY BE DELETED FOR XX = PW & GT

S.J.WERSAN

1976 DEC 9

```
.MACRO TYPE
**NUMAC 0
**NOCUN 1
```

```
**IFE ?K-1
ZLS.T1:          ;**** KWL/BV ZONE LISTS ****
**BASE=.
**KW=0
**CLEAR 0 1 2 3 4 5 6 7 8 9
**.ENDC
```

```
**IFE (?K-2)
ODA.T1:          ;**** OUTER-DIRECTORY ADDRESSES ****
**.ENDC
```

```
**IFE ?K-3
ODV.T1: ZCI      ;**** OUTER-DIRECTORY VALUES ****
**.ENDC
```

```
**IFE ?K-4
ODA.T1: ZCI      ;**** OUTER-DIRECTORY ADDRESSES ****
**.ENDC
```

```
**NOMAC 1
ZCT=0
EMPTY=-1
%
```

```
.MACRO ZONE
**NUMAC 1
ZCI=ZCI+1
```

```
.IFE ?K-1
ZN.T1=.
FL\ZCI=0
.ENDC
```

```
.IFE ?K-3
**NOMAC 0
      T2
**NOMAC 1
.ENDC
```

```
%
```

```
.MACRO LIST  
**.NUMAC 1
```

```
?I=1  
.DO .ARGC1*(?K==1)  
TRUNK=?I-1  
WORD=TRUNK/16.  
BIT=(1)B(TRUNK-(16.*WORD))  
KW=KW!((1)B(WORD))  
SET 0 1 2 3 4 5 6 7 8 9  
?I=?I+1  
.ENDC
```

%

```
.MACRO SET  
**.NUMAC 1
```

```
?J=1  
.DO 10.  
    .IFE WORD-?J  
    WD.?J=WD.?J!BIT  
    .ENDC  
?J=?J+1  
.ENDC
```

%

```
.MACRO DUPL  
** .NUMAC 1
```

```
.IFE ?K-1  
FLVZCT=2  
.ENDC
```

```
.IFE ?K-2  
DISPL=ZN.11-BASE  
.ENDC
```

```
.IFE ?K-4  
DISPL=11  
.ENDC
```

%

```
.MACRO NUL.0  
** .NUMAC 0
```

```
    KW  
** .NUMAC 1
```

```
KW=0
```

```
?I=1
```

```
.DO 10.
```

```
    .IFN WD.1?1
```

```
        ** .NUMAC 0
```

```
        WD.1?1
```

```
        ** .NUMAC 1
```

```
        WD.1?1=0
```

```
    .ENDC
```

```
?I=?I+1
```

```
.ENDC
```

%

.MACRO ZEND

\*\* .NUMAC 1

.IFE ?K-1

.IFN KW

FLVZCI=1

NOI.0 0 1 2 3 4 5 6 7 8 9

.ENDC

.ENDC

.IFE ?K-2

.IFE FLVZCI

\*\* .NUMAC 0

EMPTY

\*\* .NUMAC 1

.ENDC

.IFE FLVZCI-1

DISPL=ZN.T1-BASE

.ENDC

.IFN FLVZCI

\*\* .NUMAC 0

DISPL

\*\* .NUMAC 1

.ENDC

.ENDC

.IFE ?K-4

.IFE FLVZCI-1

DISPL=2\*(ZN.T1-BASE)

.ENDC

.IFE FLVZCI-2

DISPL=2\*(DISPL-T1-1)

.ENDC

.IFN FLVZCI

\*\* .NUMAC 0

DISPL

\*\* .NUMAC 1

.ENDC

.ENDC

%

.END